GE Medical Systems

Technical Publications

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Revision 0

LOGIQ™ α100

CE 0459

Users Manual

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Operating Documentation



GE Medical Systems

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Regulatory Requirement

1. Council Directive 93/42/EEC concerning medical devices; the CE 0459 label affixed to the product testifies compliance to the Directive. The location of the CE label is documented on page 56.

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2. 510k approval for FDA (Food and Drug Administration) registration, Department of Health, USA.

3. ETL (Electronics Testing Laboratory) certificate by ITS, based on UL 2601–1.

4. MHW (Ministry of Health and Welfare) registration for Japan.

   CAUTION **United States Federal law restricts this device to use by or on the order of a physician.**

5. *General Electric Medical Systems* is ISO 9001 and EN 46001 certified.

6. The original document was written in English.

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Introduction

System Overview

System Specifications

This section provides a basic description of the LOGIQ™ α100 system's features and benefits.

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System Overview

Attention

Read and understand all instructions in this manual before attempting to use the LOGIQ™ α100 System.

Keep this User's Manual with the equipment at all times. Periodically review the procedures for operation and safety precautions.

Prescription Device



FOR USA ONLY

Caution: United States law restricts this device to sale or use by or on the order of a physician.

System Components



Refer to the Service Manual (2139768) for LOGIQ™ α100 System components.

Indications for use

The LOGIQ™ α100 is intended for use in obstetrical, gynecological, abdominal, urology, cardiology and small parts applications.

Contraindications

Do **NOT** use the system for Ophthalmic applications (or any use causing the acoustic beam to pass through the eye).

Overview

The GE Medical Systems LOGIQ™ α100 portable ultrasound scanner is a system designed for OB/GYN, Abdomen, Urology, Cardiology and Small part scans using the convex, linear and micro convex probes. The system provides image generation in B-Mode, M-Mode, A-Mode(India only), Dual B-Mode and B/M-Mode. High quality images can be obtained by the proper selection of scan control parameters. The diagnostic capability is further enhanced by the different measurement and calculation packages available in the system.

All probes are precise solid state array devices, allowing electronically controlled imaging with Convex, Micro-convex and Linear probes. Use of solid state digital designs allows a wide variety of scan parameters to be optimized resulting in consistent generation of finely detailed anatomical resolution with excellent dynamic contrast tissue range and penetration.

The System has a sophisticated console design featuring multiple diagnostic functions and preset function keys. This makes the system user friendly and easy to use.

System Specifications

Standard Specifications

System Configuration

- Console with Keyboard
- Probe/Gel Holder (Removable)
- Probe (user selectable)
- Power Cord
- Probe Pad
- Gel Bottle
- Trackball Cleaning Kit

System Dimensions

- Height : 244 mm (9.6 inches)
- Width : 276 mm (10.9 inches)
- Depth : 405 mm (15.9 inches)

Weight

- 9.8 Kg (Without Probe)

Electrical Power

- Power Supply:
  220/240V~ 50/60 Hz, 170 VA Max, Single Phase
  100/115V~ 50/60 Hz, 140 VA Max, Single Phase

Scanning

- Convex, Micro Convex, Linear electronic scanning

Display Modes

- B-, B/M-, M-Mode, Dual B-Mode & *B/A Mode

* Applicable only for systems delivered in India

Probe Types

- C36 – 3.5 MHz Convex Array (FOV: 68°, ROC: 50 mm)
- C55 – 5 MHz Convex Array (FOV: 68°, ROC: 40 mm)
- L76 – 7.5 MHz Linear Array (FOV: 60mm)
- E72 – 6.5 MHz Micro Convex Array (TV/TR) (FOV: 114°, ROC: 10mm)
- C31 – 3.5 MHz Micro Convex Array (FOV: 85°, ROC: 13.1mm)
- VE5 – 5 MHz Linear Array (FOV: 60mm)

Display Monitor

- 7 inch monochrome B/W Display
- NTSC or PAL format
- CRT Protective Filter

Operator Interface

- Alphanumeric Keyboard
- One Active Probe Port
- Cursor Movement

  Trackball (1 inch)

Gray Scale

- 256 gray shades

Standard Specifications (cont'd)

Image Processing

- Image Reverse
- Image Rotate : 180 degrees
- Scroll

  Depth
  Lateral

Pre–Processing

- Dynamic Range : 30dB to 72dB (in 6dB steps)
- Gain Control : 0dB to 99dB (in 1dB steps)
- Time Gain Compensation:

  Near Gain < 20mm depth; –20dB to +20dB, (in 5dB Steps)

  Far Gain >20mm depth; –20dB to +20dB, (in 5dB Steps)
- Frame Averaging : 4 settings (0%, 25%, 50%, 75%)

Depth

- C36 ,C55 and C31 : 75, 100, 150, 200 mm
- E72, L76 and VE5 : 50, 75, 100, 150 mm

Post Processing

- Gray Scale Mapping (2 selections with 5 settings each)
- Sweep Speed

  B/M-Mode – 2 seconds

  M-Mode – 4 seconds

Display Annotation

- Patient Name : 28 Characters
- Patient ID : 16 Characters
- Date : 3 Types

  YY/MM/DD
  MM/DD/YY
  DD/MM/YY
- Time : 24 hour display
- Hospital Name : 30 characters
- Probe Type
- Probe Orientation
- Gray Scale
- Scale Marker (Depth, Width)
- Focus Point
- Image Depth
- Gain
- Near/Far Gain
- Dynamic Range
- Body Pattern
- Measurement Results
- Gestational Age/Calculations

Body Patterns

- OB/GYN : 8 types
- Abdomen : 8 types
  Mammo: 2 types
- Veterinary : 16 types

Measurements

- Distance
- Circumference (Ellipse/Trace)
- Area (Ellipse/Trace)
- Volume (Ellipsoid/Distance)

Standard Specifications (cont'd)

Calculations

- U.S. Version
- European Version
- Tokyo University Version
- Osaka University Version
- Australian Version

Report Page

- OB Summary Report : 5 Types

  U.S. Version
  European Version
  Tokyo University Version
  Osaka University Version
  Australian Version
- OB Average Page
- Anatomical Survey Page
- Urology Report Page

Biopsy Guidelines

- Varies with probe type

Options

- Foot switch
- Two Probe Adapter

Classification

- Type of protection against electric shock

  Class I EQUIPMENT: Degree of protection against electric shock

  TYPE BF: 

Standard Configuration

Unit

- Operator Console
- Operator Manual
- Service Manual (2139768)
  (Not applicable for India Model)
- Power Cord
- Probe (user selectable)
- Probe Pad
- Gel Bottle
- Trackball Cleaning Kit

Record (Options)

- Sony Videographic Printer UP – 890MD (100–115 Volts ~50/60Hz)
  Sony Videographic Printer UP – 890CE (220–240 Volts ~50/60Hz)

Record (Options) cont'd

- VCR Sony SVO–9500MD

Available Options

- C55 Catalog No. H45252CE
- C36 Catalog No. H45252CF
- E72 Catalog No. H45252MT
- L76 Catalog No. H45252HP
- C31 Part No. H45252CS
- VE5 Part No. H45252VE
- Foot Switch Catalog No. H45502FS
- Two Probe Adapter Part No. H41072A
- Trolley Catalog No. H41052LA

CAUTION Use only approved probes, peripherals or accessories. Please refer to the Service Manual for more information about Peripherals/Accessories and their connections.

System Description

Front View

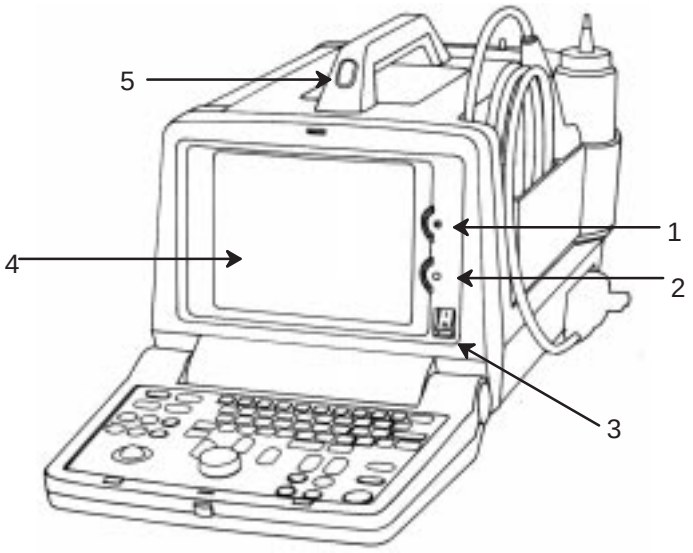


Illustration 1. Front View

1. **Brightness**: This control adjusts the brightness of the display to the operator's preference.
2. **Contrast**: This control adjusts the contrast of the display to the operator's preference.
3. **Power ON (I)/OFF (O)**: Use to turn On/Off the main AC power to the system.
4. **7–inch Monochrome Black and White Display Monitor**: It displays the image and scan parameter data.
5. **Handle**: Use to aid in the movement of the system.

Side View

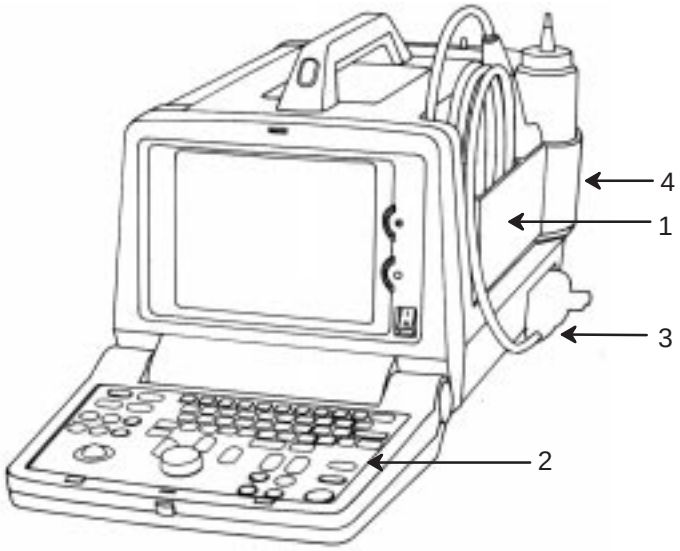


Illustration 2. Side View

1. **Probe Holder**: The probe can be stored in the probe holder, when not in use.
2. **Keyboard**: Use for patient data entry, to change scan parameters, for image annotation, VCR controls and selection of various function menus.
3. **Probe Connector**: Connects the probe to the system.
4. **Gel Holder**: Use to hold gel bottle when the LOGIQ™ α100 is being moved.

Rear View

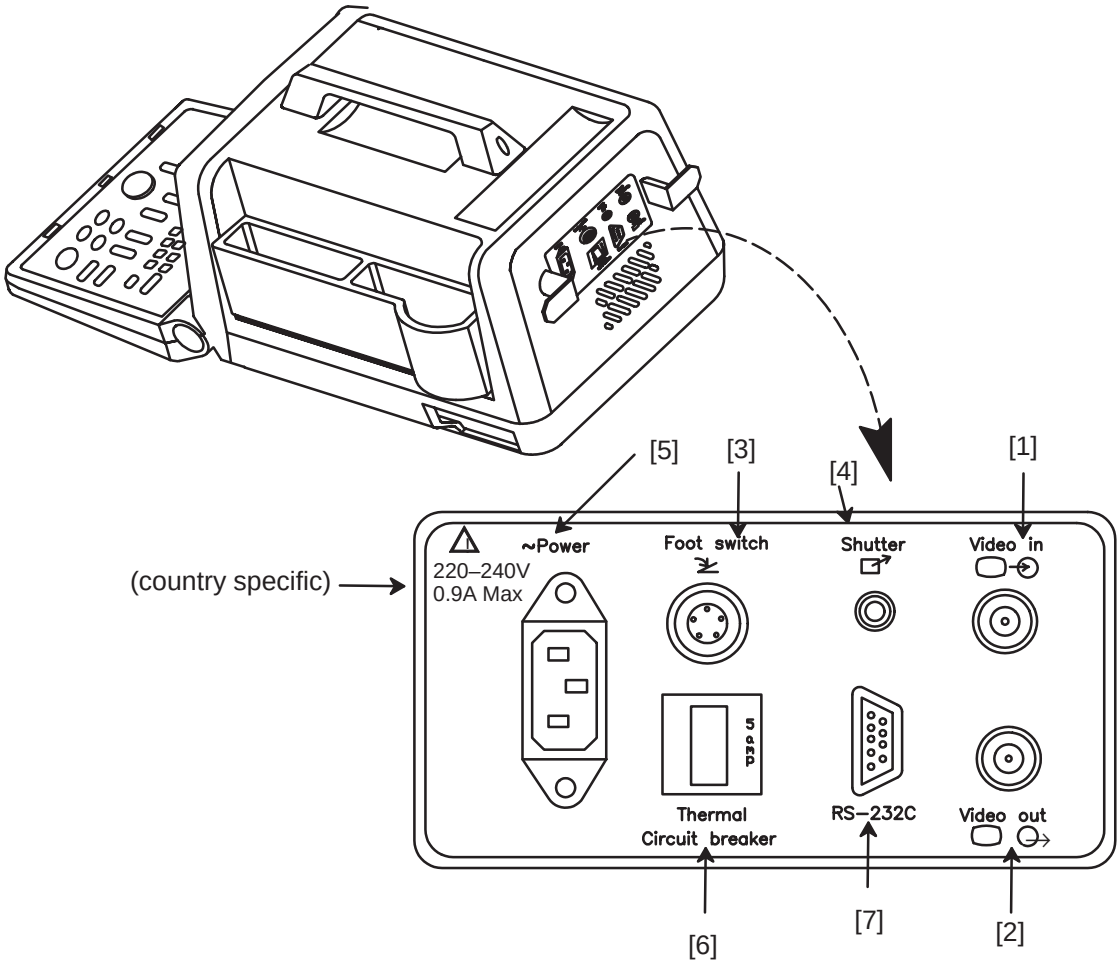


Illustration 3. Rear View

1. **Video IN**: Enables an external video signal (VCR playback).
2. **Video OUT** : Enables the connection of a video signal to external equipment (Videographic Printer, VCR Recording)
3. **Foot Switch Connection**: An optional Foot Switch is provided as an accessory to be used in parallel with or as an alternative to the Freeze key. Enables the foot switch to freeze a real-time image.

Rear View (cont'd)

4. **Shutter**: Connects the Video Graphic Printer for remote operation.
5. **Power Socket**: Connects the main AC input.
6. **Circuit Breaker**: The Circuit Breaker automatically shuts off power to the system in case of power overload.
7. **RS–232C**: Used for Line Printer Interface (Serial Port only).



NOTE: RS–232C Port shall be used with GE supplied cable only.
Refer SV Manual 2139768 Section System Configuration for RS–232C Pin out and, Section Renewal parts for the Part number of the cable to be used.

CAUTION



Each outer (case) ground line of peripheral/accessory connectors are Earth Grounded. Signal ground lines are NOT Isolated.

Use only approved probes, peripherals or accessories. Please refer to the Service Manual (2139768) for more information about Peripherals/Accessories and their connections.

Peripherals/Accessories

Optional Accessories

Foot Switch Connection

The foot switch, which is the remote *FREEZE* device, is connected to the rear panel of the system. This extra *FREEZE* switch is provided to enhance flexibility to freeze image.

Two Probe Port

The two probe port module is an option that serves as an interface to attach two probes to the single probe port of the LOGIQ™ α100. It enables users to change between probes by the press of a switch.

Trolley

The trolley is an option that serves as cart to move the LOGIQ™ α100 unit within a hospital. While performing a scan it offers ergonomical positions for monitor, probe holder, gel holder and Video Graphic Printer.

Video Graphic Printer

Connect the Video Graphic printer (Sony UP–890MD/890CE) to the Video OUT provided in the rear panel of the system. Also establish shutter connection if required.

Video Cassette Recorder

Mount the VCR (Sony SVO–9500MD) to the Video OUT socket provided in the rear panel for recording. For playback, connect the VCR to the Video IN socket.

CAUTION  Use only approved probes, peripherals or accessories. Please refer to the Service Manual (2139768) for more information about Peripherals/Accessories and their connections.

Getting Started

Preparing the System for Use

Operator Controls

System Setup

Relocating the System

This section provides more details on how features of the system are used to prepare for scanning. It briefly explains each operator control on the keyboard and monitor.

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Preparing the System for Use

Overview



Only qualified physicians or sonographers should perform ultrasound scanning on human subjects for medical diagnostic reasons. Request training, if needed.

Perform regular preventive maintenance. It is recommended that service is performed by the manufacturer or authorized service representatives only.

Never place liquids on the unit to avoid dripping into the control panel or the unit.

Ensure that unauthorized personnel do not tamper with the unit.

Local Site Requirements

In order to properly install the system, certain hardware must be in place and operational within the room where the console is used.

Before the system arrives

Ensure that the following is provided for the new system:

- A separate power outlet with a 5 amp circuit breaker for 120 VAC (USA) or 5 amp circuit breaker for 220–240 VAC (Europe, Latin America).

Before the system arrives (cont'd)

- Take precautions to ensure that the system is protected from electromagnetic interference. Precautions include:
    - Operate the system at least 15 feet away from motors, typewriters, elevators, and other sources of strong electromagnetic radiation.
    - Operation in an enclosed area (wood, plaster or concrete walls, floors and ceilings) help prevent electromagnetic interference.
    - Special shielding may be required if the console is to be operated in the vicinity of Radio broadcast equipment.



This medical equipment is approved, in terms of the prevention of radio wave interference, to be used in hospitals, clinics and other institutions which are environmentally qualified. The use of this equipment in an inappropriate environment may cause electronic interference. Refer to the LOGIQ™ α100 *Service Manual (2139768) and this manual for details. This equipment can be used in residential areas only under the supervision of physicians or qualified sonographers.*

Environmental Requirements

For proper functioning of the LOGIQ™ α100 system, care must be taken when it is transported or stored.

	Operational	**Storage**	**Transport**
Temperature	10° to 40°C 50°to 104°F	–10 to 60°C 14° to 140°F	–40° to 60°C –40° to 140°F
Humidity	30 to 75% non–condensing	30 to 90% non–condensing	30 to 90% non–condensing
Pressure	700 to 1060hPa	700 to 1060hPa	700 to 1060hPa

Table 1. Environmental Requirements

Environmental Requirements (cont'd)

System Acclimatization Time

After being transported, the system may be cold or hot. In these circumstances, allow the unit to acclimatize before turning on. It requires one hour for each 2.5° increment in temperature if the temperature is below 10°C or above 40°C.

°C	60	55	50	45	40	35	30	25	20	15	10
°F	140	131	122	113	104	95	86	77	68	59	50
hours	8	6	4	2	0	0	0	0	0	0	0

°C	5	0	–5	–10	–15	–20	–25	–30	–35	–40
°F	41	32	23	14	5	–4	–13	–22	–31	–40
hours	2	4	6	8	10	12	14	16	18	20

Table 2. System Acclimatization Time

Connecting and Using the System

Keyboard Preparation

Unlock the keyboard by pressing the lever on the front panel.

Power Cord

Adhere to the electrical power rating. The system is adaptable to 100/120 Volts or 220/240 Volts. Plug the system power plug into the AC outlet which is located in the rear panel.

Power Cord (cont'd)

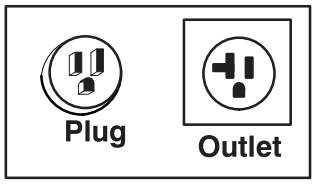
To connect the system to the power supply:

1. Ensure that the wall outlet is of the appropriate type.
2. Make sure that the power switch is turned off.
3. Unwrap the Power Cord. Ensure sufficient slack in the cable so that the plug is not pulled out of the wall if the system is moved slightly.
4. Push the power plug securely into the wall.

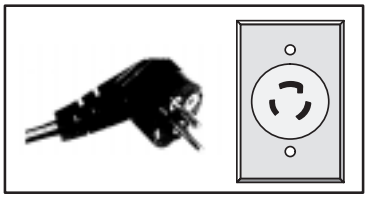
WARNING To avoid risk of fire, the system power must be supplied from a separate properly rated outlet.

The system is supplied with a power cord. Under no circumstances should this cord be altered or changed.

To assure grounding reliability, connect a 'hospital grade' or 'hospital only' grounded power outlet.



115 VAC, 140 VA
Plug and Outlet Configuration
(USA)



220 VAC, 170VA
Plug and Outlet Configuration
(Europe)

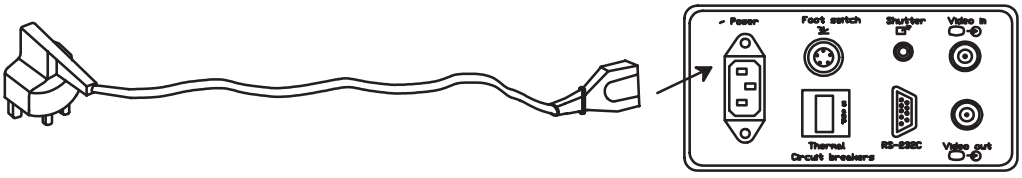


Illustration 4. Example Plug and Outlet Configurations

Circuit Breaker



The Circuit Breaker is located on the rear panel of the console. If the Circuit Breaker is ON power is provided to the system, if it is OFF it removes power to the system. It automatically shuts OFF power to the system if a power overload occurs.

If a power overload occurs:

1. Switch OFF all peripherals.
2. Switch OFF the main power switch to the console.
3. Reactivate the Circuit Breaker switch.

The Circuit Breaker switch should stay in the ON position. If the Circuit Breaker does not remain in the ON position (or trips again):

1. Disconnect the power cord.
2. Call Service immediately.

DO NOT attempt to use the system.

Foot Switch Connection (Optional)



The foot switch, which is the remote *FREEZE* device, is connected to the rear panel of the system. This optional foot switch may be used in parallel with or as an alternative to the *FREEZE* key to enhance flexibility to freeze an image. Use only the GE recommended foot switch.

Power ON/OFF

Power ON Process

The POWER ON/OFF switch is located on the front panel. To turn the power **ON**, press the "I" (ON) position on the power switch, *the Circuit Breaker on the rear panel must also be in the 'ON' position*. The following happens:

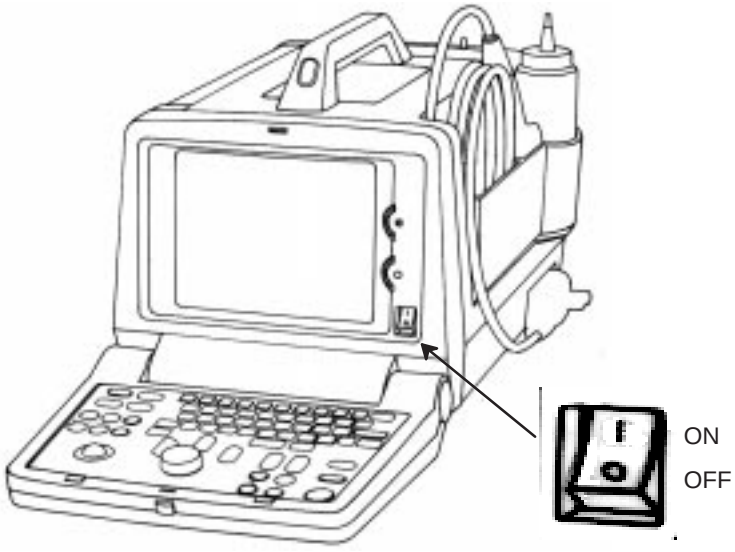


Illustration 5. Power On/Off

1. The system is initialized during this time:
   - A beep is heard.
   - The two LED's, *FREEZE* and *EXTERNAL VIDEO*, blink and go off.
   - System diagnostics run. Its status is reflected on the monitor.

Power ON Process (cont'd)



Illustration 6. Power Up Graphic

- Probes are initialized for immediate operation.
- After a few seconds the B-Mode display appears and other preset parameters like the Dynamic Range, Gain, Depth, Near and Far Gain, Scale, Map, Frame Averaging and Image Inverse and Image Reverse will take effect.

If an error occurs, an error message appears on the screen. Refer to page 311 for more information.

Power Off Process

To turn the power **OFF**, press the "O" (OFF) position on the power switch. (Refer to Illustration 5.)

1. Do not pull the power cable or turn off the circuit breaker.
2. Store the probe in the probe holder at the side of the system. Clean or sanitize the probe as necessary (Refer page 263).
3. If daily maintenance is to be performed, turn off the circuit breaker on the rear panel.

Probe Connection

Use only approved probes. Probes can be connected or disconnected from the system at any time regardless of whether the system is powered ON or OFF.

Connecting a probe

1. Carefully unwrap the probe cord.
2. **Do not** allow the probe head to hang free. Impact to the probe head could result in irreparable damage.
3. Ensure probe ‘connector lock’ lever points towards the 12 o’clock position. (See Illustration 7.)
4. Align the connector with the probe port and carefully push into place.
5. Turn the ‘connector lock’ to the 3 o,clock position to secure the probe connector.
6. Carefully position the probe cord so that it is free to move and is not resting on the floor.

When a probe is connected, the system will automatically initialize the probe.



Until the Probe is connected to the system, a ‘?’ will appear at the left top corner of the screen.

Disconnecting a probe

1. Move the probe connector lock towards the 12 o'clock position.
2. Pull the probe connector straight out of the probe port.
3. Carefully slide the probe connector away from the probe port.
4. Ensure the cable is free.
5. Be sure that the probe head is clean before placing the probe into the probe holder at the side of the system.

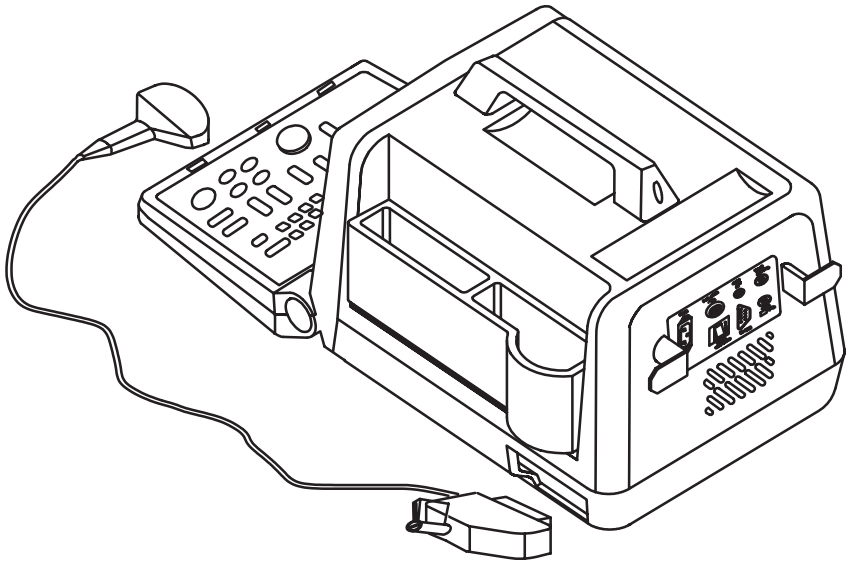


Illustration 7. Probe Connection/Disconnection

Probe Storage

It is recommended that all probes be stored carefully.

Store the probe in the probe holder at the side of the system when the system is being transported or put the probe into the probe box. Additional probes should be stored in their original shipping carton.

Adjustment of Monitor Contrast and Brightness

Adjustment of monitor CONTRAST and BRIGHTNESS is one of the most important factors for proper image quality and it should be adjusted according to the lighting in the room. If these controls are set incorrectly, the Gain and Dynamic Range may have to be changed more often than necessary to give the required image quality.

1. Turn the *CONTRAST* Rotary Pot, which is positioned on the inclined face of the front panel, clockwise or counterclockwise to get a sharp image and a complete range of gray shades. The lowest level of black should just disappear into the background and the highest white should be bright but not saturated.
2. Similarly, turn the *BRIGHTNESS* Rotary Pot, which is positioned above the Contrast Rotary Pot, clockwise or counterclockwise to increase the brightness until the background is just one shade above black.

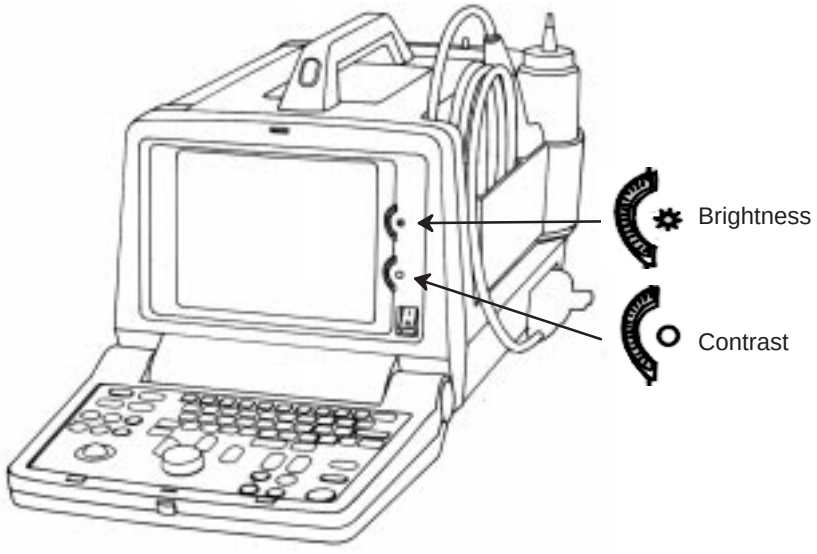


Illustration 8. Brightness/Contrast Adjustments

Connection of Peripherals and Accessories

LOGIQ™ α100 peripherals and accessories can be properly connected using the rear panel. Refer to page 12 for more details.

Located on the rear panel are VIDEO IN/OUT connections which can connect the Video Graphic Printer or VCR. Those connections are:

- the foot switch connection for the optional foot switch
- the power connector for the power cord
- the shutter which connects the Video Graphic Printer for remote operation.
- RS–232C for printer interface (Serial port only).

NOTE: RS–232C Port shall be used with GE supplied cable only.
Refer SV Manual 2139768 Section System Configuration for RS–232C Pin out and, Section Renewal parts for the Part number of the cable to be used.

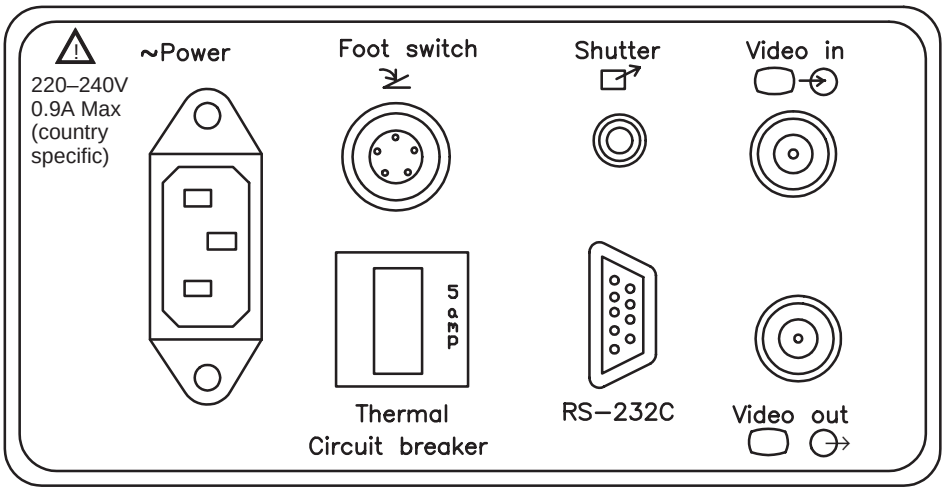


Illustration 9. Rear Panel

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Operator Controls

Keyboard Controls

Keyboard Layout

The keyboard is used for functions like data entry, image optimization, annotation and measurements/calculations.

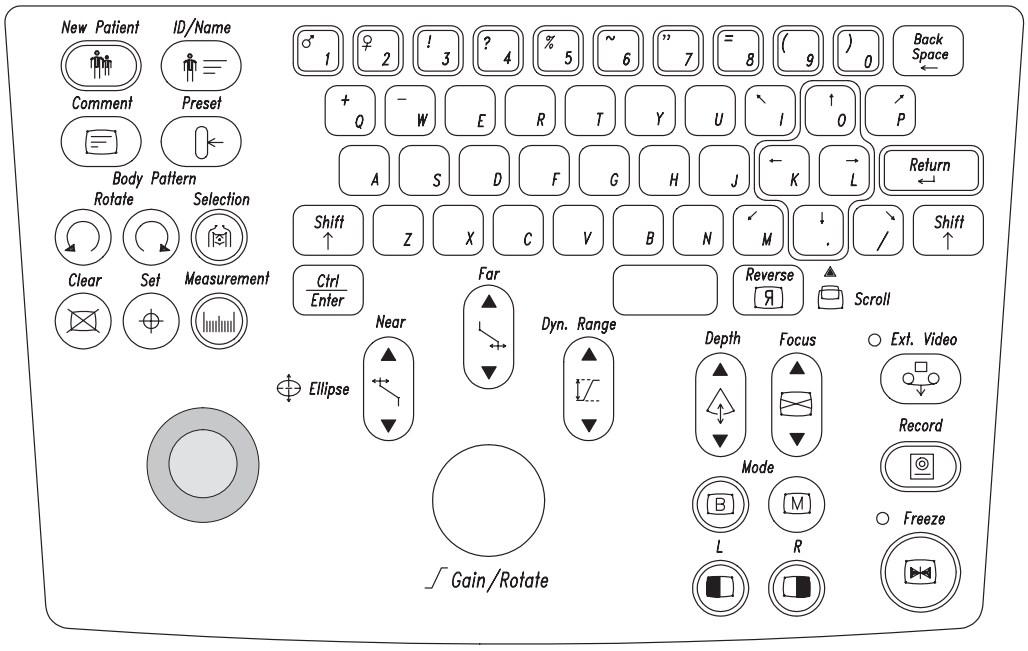


Illustration 10. Keyboard Control Layout

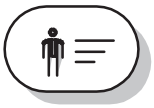
Key Description

New Patient



Press *NEW PATIENT* at the beginning of each patient study. Pressing the *NEW PATIENT* key prompts the system for the new patient entry menu. Press *CLEAR* to abort the new patient data entry if required. Pressing *NEW PATIENT* a second time clears all previous patient data, annotations, measurements, calculations and summary report pages from the system's memory and accepts the new entry and exits the menu.

ID/Name

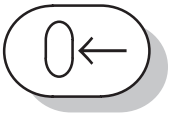


Press *ID/NAME* to enter or replace patient data without changing the current status of the system. Pressing the *ID/NAME* key enables the Patient Entry Menu. Enter Patient ID/Name using alphanumeric keys. Press *CLEAR* to abort the ID/Name menu if required. Press *ID/NAME* a second time (or *RETURN*) to exit the menu and display ID/NAME on the image display.

WARNING 

To avoid patient identification errors, always verify the identification with the patient. Make sure the correct patient identification appears on all screens and hard copy prints.

Preset



Press *PRESET* to select the default scan parameters stored for the probe connected. Parameters can be predefined using the Control–W function**.**

Comment



Press *COMMENT* to enter comments anywhere on the image area. Use the *TRACKBALL, SPACE OR RETURN* to move the cursor.

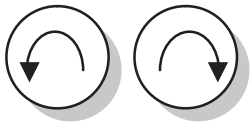
Selection



Press *SELECTION* to select a body pattern from the currently active body pattern package. Pressing the *SELECTION* key at the end of each menu (either Abdomen or OB/GYN) takes you to the next Body Pattern Package automatically.

Key Description (continued)

Rotate



The Left and Right Body Pattern *ROTATION* keys rotate the probe marker on the selected body pattern**.** When Body Pattern is not active, use the rotate keys to select next/previous options in the measurement menu. These keys are also used to move between the OB Report Page, the Measurement Averaging Page and the Anatomical Survey Page.

Measurement



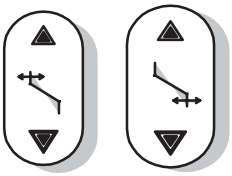
Press *MEASUREMENT* to start measurement procedures and enable calculations. The *MEASUREMENT* key also toggles the movable cursor during Ellipse adjustment and distance measurements.

Clear



The *CLEAR* key clears measurements, comments, help screen and terminates control sequences in the order in which they are done.

Near Far



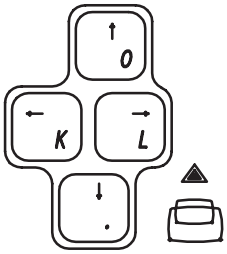
NEAR Gain controls the overall gain in the near field of the image up to 20mm depth. *FAR* Gain controls the overall gain in the far field of the image beyond 20mm depth. The *NEAR* Gain controls are also used to activate the Ellipse Measurement function after the first distance measurement has been set.

Dyn. Range



DYNAMIC RANGE adjusts the intensities of returning echoes. The echoes are converted into visual shades of gray. Adjusting the dynamic range thus affects the range of shades displayed. Increase dynamic range to get a smoother image. Decrease dynamic range to achieve an image with more contrast.

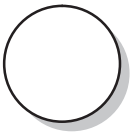
Scroll



SCROLL ← →↑↓ enables scrolling the live image Left/Right, Up/Down on the Display in B–Mode. Scrolling Up/Down in M-Mode is possible. Scrolling Left/Right in M–Mode is not possible.

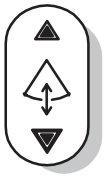
Key Description (continued)

Gain/Rotate



The *GAIN/ROTATE* knob adjusts the amplification of the returning echoes in both B- and M-Modes. When the image is frozen, this knob acts as a *ROTATE* knob used for rotating the probe marker on body patterns and the lines in Hip Dysplasia.

Depth

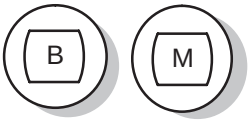


DEPTH determines the depth of the image displayed. Refer page 259 for Depth details.

Focus



FOCUS enables the selection of the optimal focal depth for transmit. A focus marker on the right side of the display indicates the image area which is focussed. Two focus markers appear in Combination Focus mode.

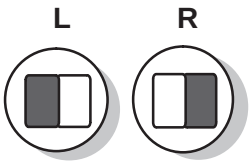


B MODE (Brightness Mode) format appears as a default when the system is turned on.

M MODE (Motion Mode) toggles between B/M- and M-Mode formats.

***A MODE** (Amplitude Mode) –Use *M* key to go to B/M. Use CONTROL Q to toggle between B/A and B/M.

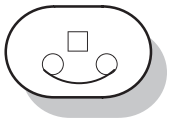
***** Applicable only for systems delivered in India.



The *LEFT/RIGHT* keys are used to display dual B-Mode images. The left image appears after the Left key is pressed. Pressing the Right key freezes the left image while activating the right image. Press *FREEZE* to freeze the active image.

Key Description (continued)

Ext. Video



EXTERNAL VIDEO enables an external video signal (VCR playback) to be viewed on the LOGIQ™ α100 system monitor. A LED lights when the key is pressed. It is a toggle key.

Record

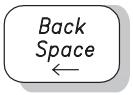


RECORD is used to trigger a device like a videographic printer to print images or report pages appearing on the display monitor.

Freeze



FREEZE is used to stop the acquisition of ultrasound data on a displayed image and freeze the image in system memory. If pressed again, it unfreezes the image and erases all measurements from the screen and continues live image acquisition.



Press *BACK SPACE* to erase individual characters to the left of the cursor while entering alphanumeric information.

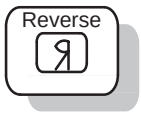


Press *RETURN* to go to the next line of annotation. It can also be used to go from one field to the next in the Installation Setup Menu, the European OB Table Setup Menu, OB Report Pages and the New Patient, ID/Name Menu.

Set



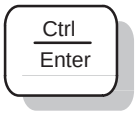
Press *SET* to start or finish an operation.



Press *REVERSE* key to reverse the image from Left to Right. Press a second time to reverse the image from Right to Left.

Press SHIFT + *REVERSE* to invert the image from Top to Bottom. Press a second time to invert the image from Bottom to Top.

Key Description (continued)



CONTROL/ENTER is used along with certain alphanumeric keys to activate all control functions. Refer Chapter Control Keys on page 237 for more details. When *CONTROL/ENTER* is pressed a second time, it is used to execute an operation. It is also used in the following contexts:

- to come out of report pages and OB User Table Editor
- to go from one field to the next in the Installation Setup Menu and the European OB Table Setup Menu.



SPACE is used to enter a distance between 2 characters or words.



TRACKBALL is used with Measurement and Annotation functions. *TRACKBALL* control depends on the last function key pressed.



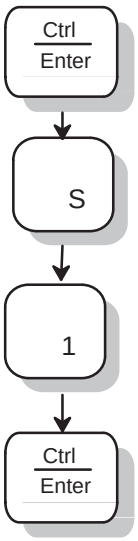
Hints

If an error is detected that limits operation, press *CLEAR* to clear the operation.

System Setup

Setup Procedure

After connecting the system, set up the system by following the procedure listed below:



Press *CTRL–S1 ENTER* for the Installation Setup menu, an Installation Setup window appears. When this function is enabled, the image, measurements, body patterns and comments (if any) are temporarily removed from the screen.

Illustration 11 Installation Setup Menu

```
                INSTALLATION SETUP

1. HOSPITAL NAME:
2. DATE FORMAT: 1
 1:DD/MM/YY 2:MM/DD/YY 3:YY/MM/DD)
3. DATE: XX/XX/XX   4.TIME: XX:XX
5.OB VERSION SELECTED: 1
  (1:US 2:TOKYO 3:OSAKA 4:EUROPE 5:ASUM)
6.FILM EXPOSURE TIME: 4
  (1:125ms 2:250ms 3:375ms 4:500ms)
7.MINIMUM FILM EXPOSURE INTERVAL : 2 (1–9 seconds)
8.VIDEO INVERT FOR REPORT PRINT  : 2 (1:YES2:NO)
9.CIRCUMFERENCE MEASUREMENT METHOD: 1
 (1:ELLIPSE 2:2DISTANCE 3:TRACE)
10. US GA SELECTION : 1(1:CUA 2:AUA)
11. ADD 1 WEEK TO EDD : 1 (1:NO 2:YES)
12. LANGUAGE : 1 (1:ENG 2:GER 3:FRE 4:ITA 5:POR 6:SPA)
13. HIP ORIENTATION:1 (1.CRANIAL LEFT  2.CAUDAL LEFT)
```

Setup Procedure (cont'd)

Use the *TRACKBALL, SHIFT* ↑↓← → , *CTRL/ENTER* or *RETURN* keys to move from up/down, or left/right to edit the fields. Use *BACK SPACE* to delete a character to the left of the cursor.



Press *SET* to register the inputs and return to the original display. Pressing any other key would result in a beep, indicating it is an error.



Press *CLEAR* to return to the original display without registering any inputs.

Relocating the System

Moving the system

When moving or transporting the system, follow the precautions below to ensure maximum safety of personnel, system and other equipments.

1. Switch OFF power to the system.
2. All cables connecting the peripherals (Video Graphic Printer, etc.) should be disconnected from the system.
3. Ensure that no loose items are left on the console.
4. Lock the keyboard onto the front panel.
5. Wrap the system's power cord securely onto the hooks on the rear side of the system.
6. Put the probe into the probe holder or the probe box provided with the probes.
7. Put the gel bottle into the gel holder at the side of the system.
8. Carry the equipment by grasping the handle on top of the system.
9. When using the Two Probe Port Option do not carry the system with the probes connected to the Two Probe Port. This will avoid damage to the probe connectors. Always carry the equipment with the Two Probe Port facing away from your body.

CAUTION  Do not apply any pressure on the system. Make sure the handle is free from any oil, gel or any slippery substance which may cause the system to drop.

Transporting the system

Use extra care when transporting the system using vehicles. Follow precautions below:

1. Keep the unit upright.
2. Prevent vibration damage by driving cautiously. Avoid unpaved roads, excessive speeds and sudden stops and starts.

Safety

Precaution Levels

Hazard Symbols

Patient Safety

Equipment and Personnel Safety

Device Labels

Warning Labels/Locations

This section is important in order to become familiar with precaution levels and hazard symbols used in this manual and on the system. It explains patient, system and personnel safety concerns. The controls that affect acoustic output levels are shown in table form.

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Precaution Levels

Overview

This section is important in order to become familiar with precaution levels and hazard symbols used in this manual and on the system. It explains patient, system and personnel safety concerns. The controls that affect acoustic output levels are shown in the form of a table.

Before using the machine, study the manual. Carefully review the manual periodically for warnings, safety precautions and maintenance requirements to avoid conditions that could result in injury.

Icon Description

Precautionary statements and warning labels are provided in various locations on the LOGIQ™ α100 console and throughout this manual to alert the user to hazards or situations that could result in injury or equipment damage. Symbols are often used with these warnings to increase user awareness and emphasize particular hazards. The user should become familiar with the meaning of symbols and the intent of all product warnings and precautionary statements.

DANGER  Indicates that a specific hazard is known to exist which through inappropriate conditions or actions will cause:

- Severe or fatal personal injury.
- Substantial property damage.

Icon Description (cont'd)

WARNING 

Indicates that a specific hazard is known to exist which through inappropriate conditions or actions may cause:

- Severe personal injury.
- Substantial property damage.

CAUTION 

Indicates that a potential hazard may exist which through inappropriate conditions or actions will or can cause:

- Minor injury.
- Property damage.



Indicates precautions or prudent use recommendations that should be used in the operation of the ultrasound system, specifically:

 **FOR USA ONLY**

- Use of the ultrasound system as a prescription device under the order of the physician.
- Noting or emphasizing a necessary operator action.
- Maintaining an optimum system environment.
- Step or time saving recommendations.

Hazard Symbols

Icon Description

Potential hazards are indicated by the following icons:

Icon	Potential Hazard	Usage	Source
 **Biological Hazard**	• Patient/user infection due to contaminated equipment.	• Cleaning and care instructions • Sheath and glove guidelines	ISO 7000 No. 0659
 **Electrical Hazard**	• Electrical micro-shock to patient, e.g., ventricular fibrillation initiated. • Electrical macro-shock to patient/ user.	• Probes • ECG • Connections to rear panel	
 **Acoustic Output Hazard**	• Patient injury or tissue damage from ultrasound radiation.	• ALARA, the use of acoustic output following the **a**s **l**ow **a**s **r**easonably **a**chievable principle	
 **Explosion Hazard**	• Risk of explosion if used in the presence of flammable anesthetics.	• Keep away form flammable anesthetic	

Table 3. Potential Hazards

Icon Description (cont'd)

Icon	Potential Hazard	Usage	Source
 **Smoke & Fire Hazard**	• Patient/user injury or adverse reaction from fire or smoke. • Patient/user injury from explosion and fire.	• Replacing fuses • Outlet guidelines	
 **Non–Ionizing Radiation**	• Console failure, erratic operation or output error due to RF interference.	• RF	IEC 878 No. 03-04

Table 3. Potential Hazards (cont'd)

Important Safety Considerations

The following sections (*Patient Safety*, and *Equipment and Personnel Safety*) are intended to make the equipment user aware of particular hazards associated with the use of this equipment and the extent to which injury can occur if precautions are not observed. Additional precautions may be provided throughout the manual. The equipment user is obligated to be familiar with these concerns and avoid conditions that could result in injury.

Patient Safety

Related Hazards

The concerns listed below can seriously affect the safety of patients undergoing a diagnostic ultrasound examination.

Patient Identification

Patient ID/Name should be entered accurately. Make sure correct patient ID is provided on all recorded data and hard copy prints. Identification errors could result in an incorrect diagnosis.

Diagnostic Information

Equipment malfunction or incorrect settings can result in measurement errors or failure to detect details within the image. The equipment user must become thoroughly familiar with the equipment operation in order to optimize its performance and recognize possible malfunctions. Applications training is available through your local GE representative. Added confidence in your equipment operation can be gained by establishing a quality assurance program.

Only qualified physicians and sonographers should perform Ultrasound scanning on human subjects for medical diagnostic reasons. Exposure levels to be kept to minimum and to be consistent with recommended practices for diagnostic evaluation.

Clinical Diagnosis

Calculation formulas and data base are provided only as a tool and should not be the basis in which clinical diagnosis can be made. The user is encouraged to research the articles and sample the output data from this device and make a judgement as to the utility of this and calculation results as a clinical tool.

Related Hazards (cont'd)

Mechanical Hazards

Damaged probes or improper use and manipulation of intracavitary probes can result in injury or increased risk of infection. Handle the probes with care. They may be damaged if dropped or mishandled. A damaged probe has to be scrapped. It cannot be repaired or reused. Do not allow the lens to come into contact with a sharp object or to be knocked against an object. Be sure to put the transducers in the side slot before transporting.



Electrical Hazard

A damaged probe may cause an electrically hazardous condition if conductive solutions come in contact with internal live parts. Do not use any probe with damaged lens to scan a patient. Inspect probes often for cracks or openings which could allow liquid entry.

To avoid electrical shock, use only the supplied power cords and connect them only to properly grounded (three hole) wall outlets. Do not use a 2 prong–adaptor.

The system should be operated within the voltage limits defined in *Standard Specifications* on page 5.

Do not place liquids on or above the console. If the liquid spills, it may come in contact with live parts and increase the risk of shock.

This system contains no operator serviceable components. Do not remove the system covers. Only qualified Service personnel should service the system. Accidentally contacting the electrical circuits inside the housing could cause serious injury. Do not use with defibrillators.

Related Hazards (cont'd)



Acoustic Output Hazard

Although there have been no confirmed adverse effects produced by diagnostic levels of ultrasound, avoid unnecessary exposure of ultrasound energy to the human body. Wrong scan settings, probe positioning and tissue type can result in injury. Use the minimum necessary output to get the best diagnostic image or measurement during an examination. Begin an exam with a probe that provides optimum focal depth and penetration.

Follow the principle of "as low as reasonably achievable" (ALARA) when scanning patients. Once an optimal image is achieved, the need for prolonging the exposure cannot be justified.

The principle of ALARA, which stands for "As Low As Reasonably Achievable", is to keep the radiation exposure at the minimum level necessary to obtain the diagnostic information. This principle is widely practiced in medical X–ray protection where exposure at any level is potentially harmful. Historically, ALARA was initiated as a cautious approach for dealing with uncertain hazards but has since become the principle method for reducing the risk of injury from hazards that do not have safe minimum thresholds.

While no minimum thresholds for harmful bio-effects have been established with the use of diagnostic ultrasound, the principle of ALARA can be readily implemented on equipment incorporating an output display. As the operator adjusts the equipment to optimize the image quality, the display interactively updates to indicate the effect on output.

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Equipment and Personnel Safety

Related Hazards

The concerns listed below can seriously affect the safety of the equipment and personnel during a diagnostic ultrasound examination.



Explosion Hazard

Do not operate the system in the presence of flammable anesthetics. The system is not designed for such use, since it can lead to an explosion.

WARNING 

This equipment contains dangerous voltages that can cause serious injury or death.



Electrical Hazard

To avoid injury:

- Do not remove protective covers. No user serviceable parts inside. Refer servicing to qualified service personnel.
- To assure adequate grounding, connect the power plug to a reliable (hospital grade) grounding outlet (having a equalization conductor ⏚).
- Do not place liquids on or above the console. Spilled liquid may contact live parts and increase the risk of shock.



Smoke & Fire Hazard

The system must be supplied from an adequately rated power outlet. The capacity of the power outlet must be as specified in the LOGIQ™ α100 Service Manual (2139768).

Related Hazards (cont'd)



Biological Hazard

For patient and personnel safety beware of biological hazards while performing invasive procedures. To avoid the risk of disease transmission:

- Use protective barriers like FDA cleared gloves and probe sheaths. Follow sterile procedures when appropriate.
- Thoroughly clean probes and reusable accessories after each patient examination and disinfect or sterilize as needed. Refer to page 263 for details.
- Follow all infection control policies established by your office, department or institution as they apply to personnel and equipment.



FOR USA ONLY

Caution: United States law restricts the device to sale or use by or on the order of the physician.

CAUTION



Devices containing latex may cause severe allergic reaction in latex sensitive individuals. USA customers should refer to the FDA's March 29, 1991 Medical Alert on latex products.

Device Labels

Label Icon Description

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Label	Publication	Description	Location
	IEC 417–5032	Alternating Current Single Phase	Rear Panel
	IEC 417–5019	Protective earth (grounding)	Internal
	IEC 417–5036	Warning, High Voltage	On the CRT, on the fly back transformer
	IEC 417–5007	ON (Power: connection to the Mains)	Front Panel
	IEC 417–5008	OFF (Power: disconnection from the Mains)	Front Panel
	IEC 417–5056	Brightness	Front Panel
	IEC 417–5057	Contrast	Front Panel
	IEC 878–01–36	Video Input	Rear Panel
	IEC 878–01–37	Video Output	Rear Panel

Table 4. Device Labels (Part 1)

Label Icon Description (cont'd)

Label/Symbol	Description	Location
Identification and Rating Plate	• Manufacturer's name and address • Date of Manufacture • Model and Serial numbers • Electrical ratings	Rear of Console
Type/Class Label	Used to indicate the degree of safety or protection	Rear of Console
Device Listing/ Certification Labels	Laboratory logo or labels denoting conformance with industry safety standards such as UL or IEC	Rear of Console
"DANGER – Possible explosion hazard, if used in the presence of flammable anesthetics."	This system is not designed for use with flammable anesthetic gases	External
	"ATTENTION – Consult accompanying documents" is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Rear of Console
	Type BF Equipment (man in the box symbol) IEC 878–02–03 indicates B Type equipment having a floating applied part.	External
	"CAUTION" The equilateral triangle is usually used in combination with other symbols to advise or warn the user.	Rear of Console
IP Code (IPX1)	Indicates degree of protection provided by the enclosure for IEC 529. IPX1 indicates drip proof.	Foot Switch

Table 5. Device Labels (Part 2)

Classifications

Type of protection against electric shock: Class I EQUIPMENT *1

*1. Class I EQUIPMENT

EQUIPMENT in which protection against electric shock does not rely on BASIC INSULATION only, but which includes an additional safety precaution in that means are provided for the connection of the EQUIPMENT to the protective earth conductor in the fixed wiring of the installation in such a way that ACCESSIBLE METAL PARTS cannot become LIVE in the event of a failure of the BASIC INSULATION.

Degree of protection against electric shock: Type BF EQUIPMENT *2

*2. Type BF EQUIPMENT

Type B EQUIPMENT with a F–TYPE isolated applied part providing a degree of protection against electric shock to such a degree that the allowable PATIENT LEAKAGE CURRENT under SINGLE FAULT CONDITIONS is not exceeded when 1.1 times the highest rated MAINS VOLTAGE is applied between the APPLIED PART and earth.

EMC – Electromagnetic Compatibility

EMC Performance

All types of electronic equipment may characteristically cause electromagnetic interference with other equipment, either transmitted through air or connecting cables. The term EMC indicates the capability of the equipment to curb electromagnetic influence from other equipment and at the same time not affect other equipment with similar electromagnetic radiation from itself.

This product is designed to fully comply with the EN60601–1–2 (IEC601–1–2), Class A, in medical electric equipment EMC regulations.

Proper installation following the service manual is required in order to achieve the full EMC performance of the product.

In case of issues related to EMC, please call your service personnel.

EMC – Electromagnetic Compatibility (cont'd)

Notice upon Installation of Product

1. Use either power supply cords provided by GE Medical Systems or ones designated by GE Medical Systems. Products equipped with a power source plug should be plugged into the fixed power socket which has the protective grounding conductor. Never use any adaptor or converter to connect with a power source plug (i.e. three–prong–to–two prong converter).
2. Locate the equipment as far away as possible from other electronic equipment.
3. Be sure to use only the cables provided by or designated by GE Medical Systems. Connect these cables following the installation procedures (i.e. wire power cables separately from signal cables).
4. Lay out the main equipment and other peripherals following the installation procedures described in the Service manual.

General Information

1. Designation of Peripheral Equipment Connectable to this Product, refer page 25. These Peripherals can be hooked up to the product without compromising its EMC performance.
2. Avoid using equipment not designated for the LOGIQ™ α100. Failure to comply with this instruction may result in poor EMC performance of the product.
3. Notice against User Modification:

   Never Modify this product. Unilateral user modification may cause degradation in EMC performance.

   Modification of the product includes:

   a. Changes in cables (length, material, wiring etc.)
   b. Changes in system insulation/layout.
   c. Changes in system configuration/components.
   d. Changes in securing system parts (cover open/close).

EMC – Electromagnetic Compatibility (cont'd)

4. Operate the system with all covers closed. If a cover is opened for some reason ensure to shut it before starting/resuming operation.



NOTE: Operating the system with any cover open may affect EMC performance.

CAUTION



Do not use the following devices near the LOGIQ™ α100 *system. Devices which intrinsically transmit radio waves such as cellular phone, radio transceiver, mobile radio transmitter radio–controlled toy, etc. Use of these devices could cause the* LOGIQ™ α100 *system to perform outside the published specifications. Keep power to these devices turned off when near the system.*

Medical staff in charge of the LOGIQ™ α100 *system is required to instruct technicians, patients and other people who may be around the system to fully comply with the above regulation.*

EMC – Electromagnetic Compatibility (cont'd)

Patient Environmental Devices

Acceptable Devices

CAUTION 

Do not connect any probes or accessories without approval by GE. Those listed in Page7 have been tested and verified to be compatible with the LOGIQ™ α100 system.

Unapproved Devices

CAUTION 

The user takes all responsibility for connecting unapproved devices. If devices are connected without the approval of GE, the warranty will be INVALID.

Any devices connected to the LOGIQ™ α100 System must conform to one or more of the requirements listed below:

- IEC 50, IEC 65, IEC 335, IEC 348, IEC 414, IEC 820, IEC 950, IEC 1010–1, ISO 7767, ISO 8185, ISO 8359 OR IEC 601–1.
- The devices should be connected to 'Protective Earth' (Ground).

Warning Labels/Locations

Warning Labels

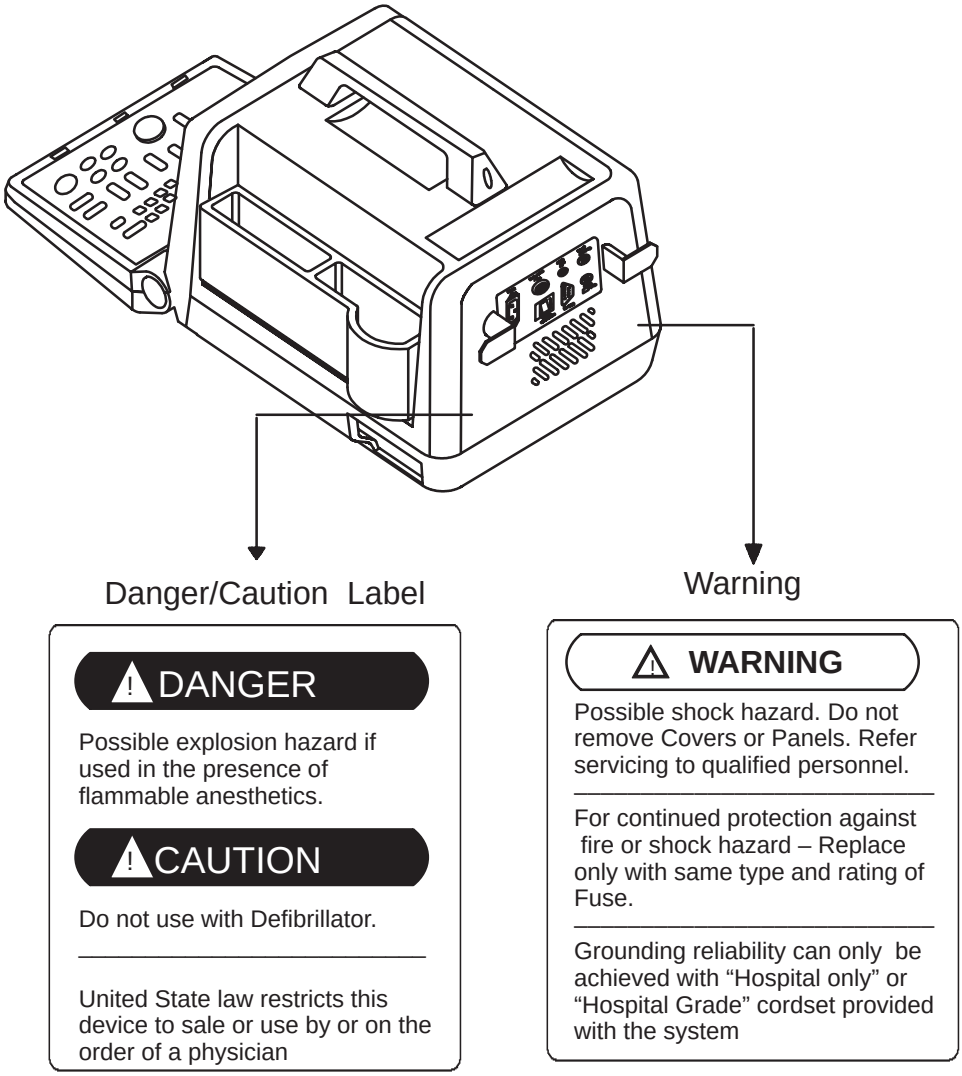

Danger/Caution Label
Warning
DANGER
Possible explosion hazard if used in the presence of flammable anesthetics.
CAUTION
Do not use with Defibrillator.
United State law restricts this device to sale or use by or on the order of a physician
WARNING
Possible shock hazard. Do not remove Covers or Panels. Refer servicing to qualified personnel.
For continued protection against fire or shock hazard – Replace only with same type and rating of Fuse.
Grounding reliability can only be achieved with “Hospital only” or “Hospital Grade” cordset provided with the system

Illustration 12. Warning Label Locations

Warning Labels (cont'd)

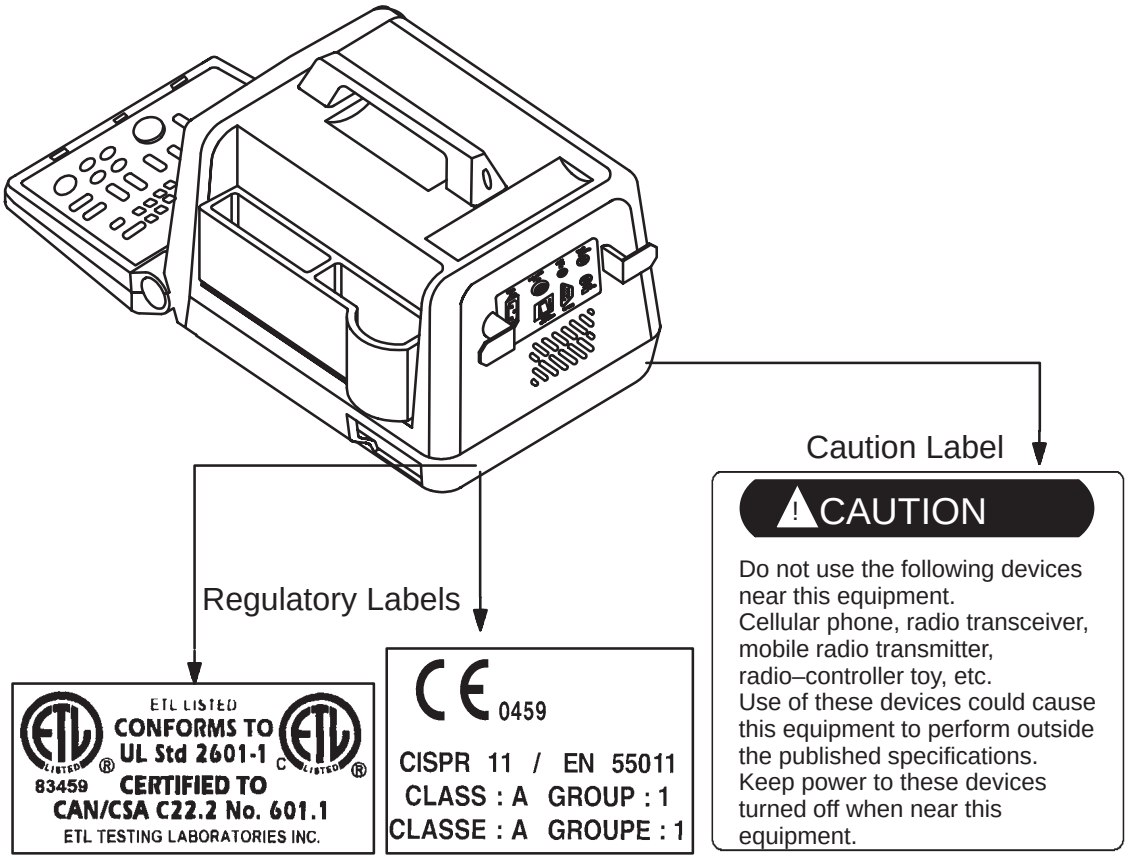
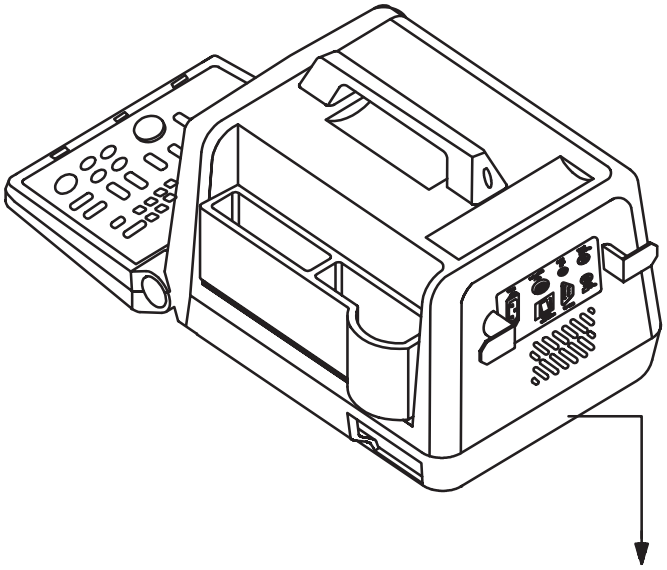
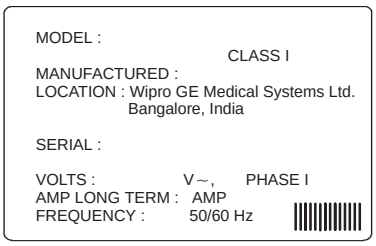

Caution Label
CAUTION
Do not use the following devices near this equipment.
Cellular phone, radio transceiver, mobile radio transmitter, radio–controller toy, etc.
Use of these devices could cause this equipment to perform outside the published specifications.
Keep power to these devices turned off when near this equipment.
Regulatory Labels
ETL LISTED
CONFORMS TO
UL Std 2601-1
83459
CERTIFIED TO
CAN/CSA C22.2 No. 601.1
ETL TESTING LABORATORIES INC.
CE 0459
CISPR 11 / EN 55011
CLASS : A GROUP : 1
CLASSE : A GROUPE : 1

Illustration 12. Warning Label Locations (cont'd)

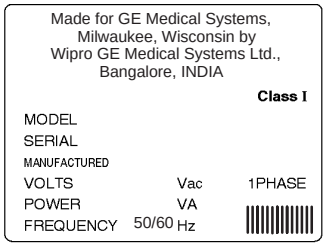
Warning Labels (cont'd)



Rating Plate



For Europe



For Asia & America

Illustration 12. Warning Label Locations (cont'd)

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Scan Procedures

Patient Registration

Image Display

Scan Adjustments

VCR Operations

Two Probe Port

This section describes the basic elements of the system and it displays common types of modes of scanning.
This section is a guide to perform a scan. It includes scan adjustments required to get optimal image display.

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Patient Registration

Introduction

Turn ON the System by pressing the POWER Switch to the “I” (ON) position. The system beeps once and runs a self test. The system defaults to B-Mode format.

Patient Registration Procedure

Begin an exam by entering new patient information.

Press the *NEW PATIENT* key at the beginning of each patient study. A patient data entry menu appears on the monitor. Enter Patient Identification (16 characters) using alphanumeric keys, press *RETURN* to go to the Patient Name field (28 characters). Enter Patient Name.

Press *RETURN* or *NEW PATIENT* to register the inputs and exit out of the menu

or

Press *CLEAR* to exit *NEW PATIENT* and abort entry if required.

Patient Registration Procedure (cont'd)

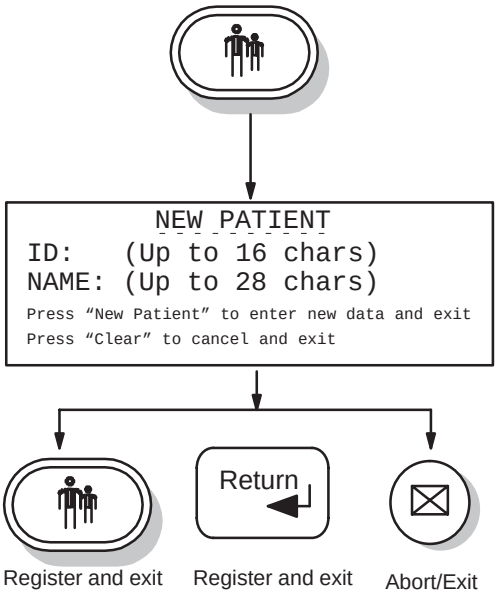


Illustration 13. New Patient Entry

NOTE: To modify only Patient Information without erasing other data, press the ID/NAME key. Pressing ID/NAME allows modification of patient data without erasing patient image, measurements, calculations and summary reports.

Pressing NEW PATIENT key twice, clears all patient data, annotations, measurements, calculations and summary report pages from the system's memory.

Patient Scan Procedure

1. Position the patient in a lying down position and apply Acoustic gel to the probe and on the patient. Position the transducer on the patient, adjust the imaging controls to produce a high quality image.
2. Begin the scan on the patient.

Patient Scan Procedure (cont'd)

3. A real-time image appears on the monitor through the following controls:
   - Orient the probe on the patient based on the study to be performed or view to be obtained.
   - Increase or decrease the overall *GAIN*, *NEAR* and *FAR* gain controls and *DYNAMIC RANGE* to obtain the desired Image quality.
   - If the image is not bright, increase the overall 'Gain' until the appropriate brightness is obtained. The amplitude of returning echoes should be optimally displayed.
   - Increase *DYNAMIC RANGE* to get a smoother image.
   - Decrease *DYNAMIC RANGE* to get an image with more contrast.
   - Position the *FOCUS* marker in the area of interest.
4. Press *FREEZE* to stop image acquisition and to start measurements.
5. Refer to the Chapter on *General Measurements* for details on making measurements.
6. Enter comments on the image area if required.
7. The image and the report page can be printed using a Video Graphic Printer. Patient's Name and Identification Number is transferred with each Image during hard copy printing.

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Image Display

Overview

The LOGIQ™ α100 system offers a variety of display formats. Each format shows the operator valuable information relating to patient data and system scan parameters.

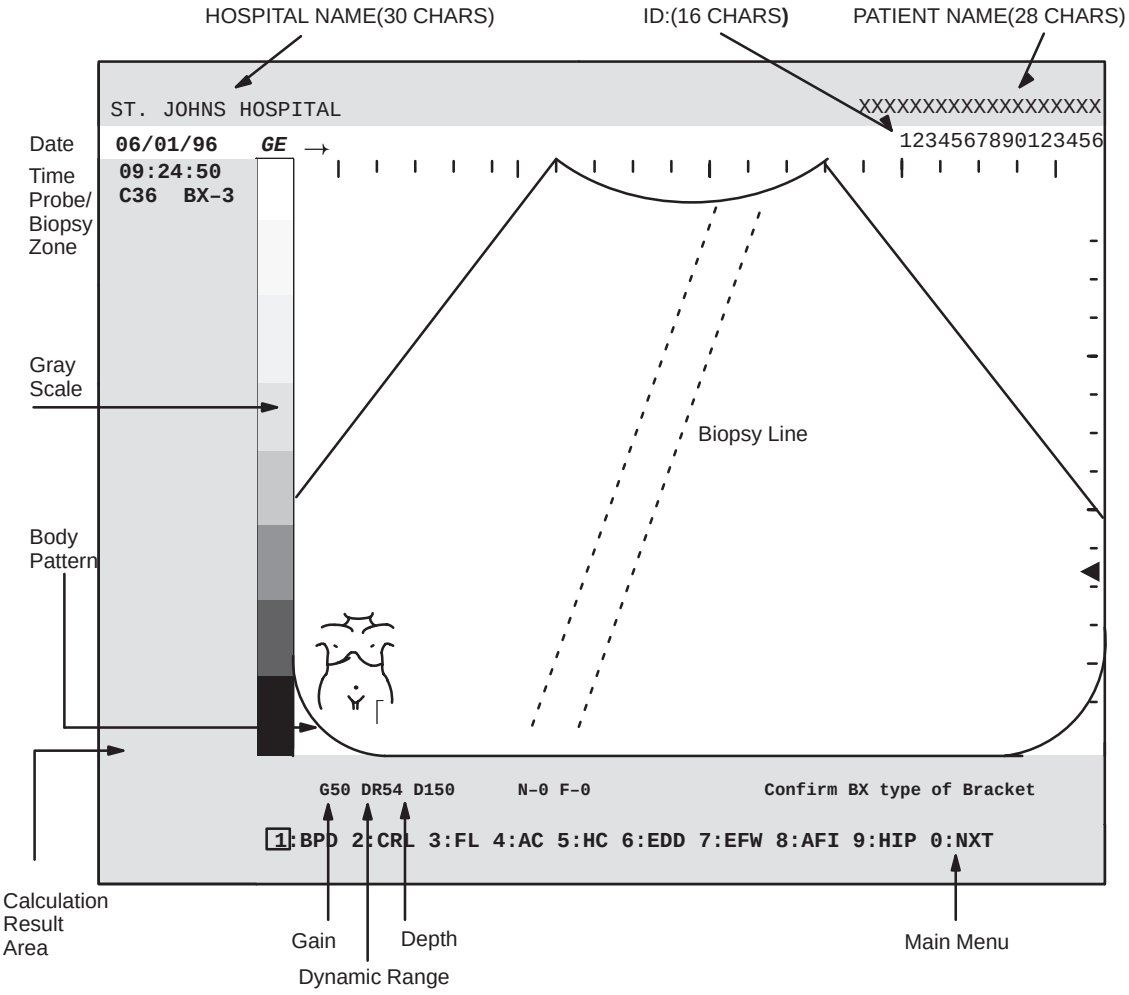


Illustration 14. Monitor Display

***B/A-Mode**



Press the *M* Mode key to acquire a *B/M*-Mode image. Press CONTROL Q to go to *B/A* Mode. The *B*-Mode image appears on the left side and the A-Mode image appears on the right side. To exit the *B/A* Mode, press CONTROL Q again and it reverts to *B/M* Mode. Press the *B* Mode key to return to the original display. Not exiting the *B/A* Mode by pressing CONTROL Q causes the system to default back to *B/A* Mode when the M–Mode key is pressed in B–Mode and M–Mode.

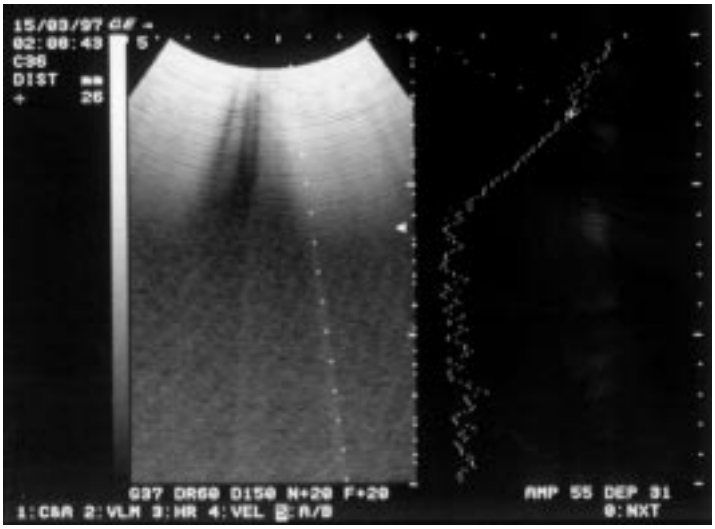


Illustration 15. B/A Mode Display



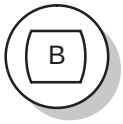
NOTE: When the B Mode key is pressed in B/A Mode, the system returns to B-Mode retaining current scan values. It erases measurements. If M Mode key is pressed now the system goes back to B/A Mode. When M Mode key is pressed in B/A Mode, the system reverts to M Mode and if M Mode key is pressed again it goes back to B/A Mode.

Only Distance Measurements are possible in B/A Mode. A/B Ratio is the only calculation that is allowed. Invoking Heart Rate, Velocity or Volume measurements causes the system to beep and displays and ILG message.

Dynamic Range, Focus, Depth and Gain Control adjustments affect the B/A-Mode image.

***** Applicable only for systems delivered in India.

B-Mode



B-Mode display appears by default when the system is turned ON. While working in another mode, press the *B* Mode key to return to the B-Mode Display.



Illustration 16. B-Mode Display

B-Mode (cont'd)

B-Mode Display	Description
Hospital Name	Shows the name of the hospital or institution. A maximum of 30 alphanumeric characters can be entered. Press CONTROL–S1 to display the Installation Setup menu and input hospital name.
Patient Name	A maximum of 28 characters. Press the NEW PATIENT key or ID NAME key and input name.
ID	Patient Identification Number. A maximum of 16 alphanumeric characters. Press the NEW PATIENT key or ID NAME key and input ID.
Date	Current date according to the system settings, press CONTROL–S1 to display the Installation Setup menu and input current date. Select date format in the Installation Setup menu: DD/MM/YY, MM/DD/YY or YY/MM/DD.
Time	Displays the current time during normal operation. Press CONTROL–S1 to display the Installation Setup menu and input the current time.
Probe	Probe name of the active probe.
Depth	Shows the display depth.
Gray Scale	Shows the B-Mode Gray Scale assignment.
Body Pattern	Shows the Body Pattern selected for scan orientation.
Calculation Result Area	Displays all the calculation results.
Gain	Displays the overall B-Mode or M-Mode Receive Gain.
Dynamic Range	Dynamic Range shows the range over which the echo intensities are converted to gray scale. Displayed in 6 dB steps. Adjustable from 30-72 db.
Transmitting Focus ◀	Provides optimal focal depth for transmit**.** Press the *FOCUS* up/down key. A marker appears on the right side of the display on the vertical scale.
Near Gain	Displays the overall *NEAR* gain in the near field of the image which is closer to body surface. Displayed in dB (5dB increments).
Far Gain	Displays the overall *FAR* gain in the far field of the image which is further away from the body surface. Displayed in dB (5dB increments).
Menu Screen	Displays the Measurement Menu

Table 6. B-Mode Display Details

B/M-Mode



Press the *M* Mode key to acquire a B/M-Mode image. The B-Mode image appears on the left side and the M-Mode image appears on the right side. Use the *TRACKBALL* to move the M-line on the B-Image to get the corresponding M-Image display. Press the *B* Mode key to return to the original display.

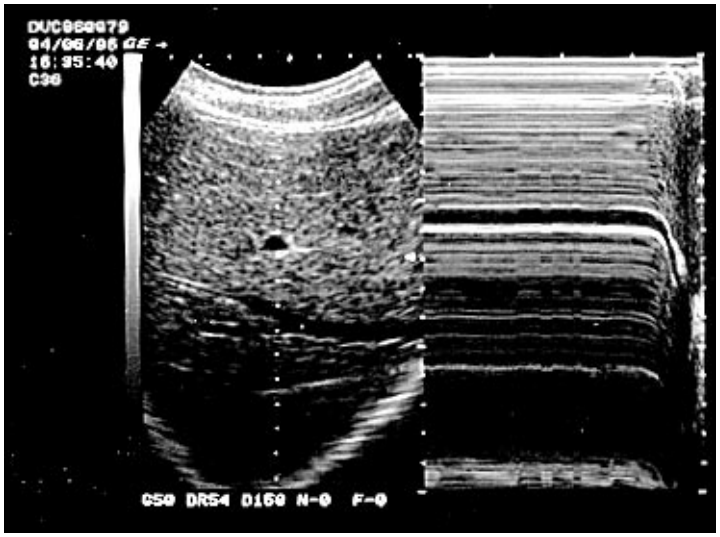


Illustration 17. B/M-Mode Display



NOTE: When the B Mode key is pressed in B/M Mode, the system returns to B-Mode retaining current scan values. It erases measurements.

Dynamic Range and Gain Control adjustments affect the M-Mode image as well as the B-Mode image.

M-Mode



The M-Mode is the motion mode. Press the *M* Mode key a second time to switch from the B/M-Mode image to the M-Mode display. It is a toggle key. Press the *B* Mode key to return to the original display.

Dynamic Range and Gain Control adjustments affect the M-Mode image.

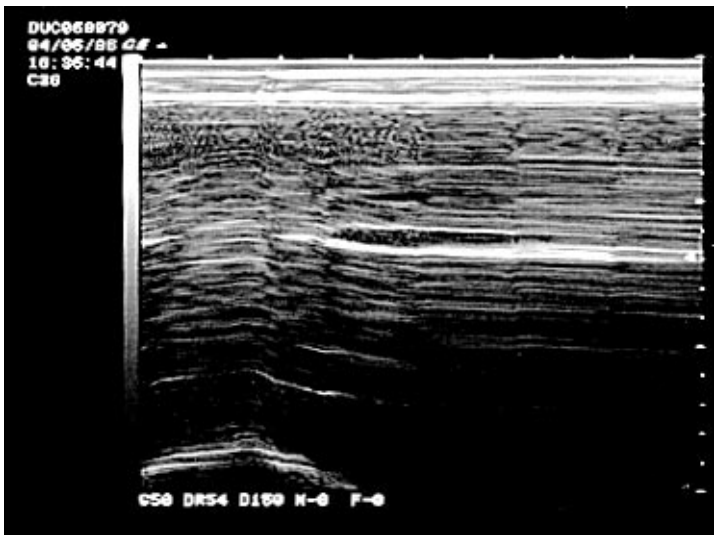
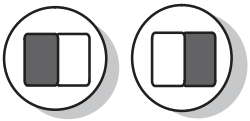


Illustration 18. M-Mode Display

Multiple Image Display



Press the *LEFT/RIGHT* key to display dual B-Modes. Press the *LEFT* key to activate the left image. When the *RIGHT* key is pressed, the right image becomes active while freezing the left image and vice versa. Press the *B* Mode key to return to a single B-Mode display.



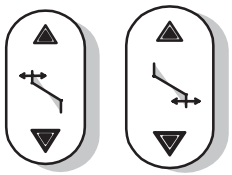
Illustration 19. Multiple Image Display

NOTE: When Left/Right Images are frozen by the FREEZE key, the LEFT/RIGHT key cannot unfreeze the two images.

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Scan Adjustments

Near and Far Gain



Press the *NEAR* up/down keys to increase or decrease the overall gain in the near field of the image which is closer to body surface. Press the *FAR* up/down keys to increase or decrease the overall gain in the far field of the image which is further away from the body surface. The range of values possible are –20dB to +20dB (in 5dB increments). This is not effective when the image is frozen.

Dynamic Range



DYNAMIC RANGE adjusts the intensities of returning echoes. The echoes are converted into visual shades of gray. Adjusting the dynamic range thus affects the range of shades displayed.

Increase the dynamic range to display weaker echoes and give the image a softer appearance.

Decrease the dynamic range to eliminate weaker echoes and reduce background “noise” or “snow”. The range of values possible are 30dB to 72dB (in 6dB increments).

NOTE: Dynamic Range is a pre-processing function. Activating Dynamic Range when the screen is frozen has no effect on the image.

Focus Selections

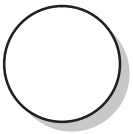


FOCUS enables the selection of the optimal focal depth for transmit. Press the upper or lower half of the key to select one of the five available options. The first four options select individual focus levels. The fifth option is a combination focus optimized for each probe. An arrow on the right scale indicates the image area which is focussed.



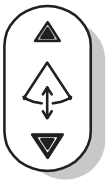
Focus function selects the transmit focus depth only. Focus has no effect on the image when the screen is frozen.

Gain/Rotate



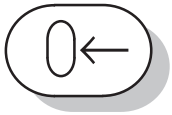
GAIN/ROTATE knob adjusts the amplification of the returning echoes in both B- and M-Modes.

Depth Key



DEPTH determines the depth of the image displayed. The depth options can be selected by pressing Up/Down. Refer page 259 for Depth details.

Preset Parameter



Press *PRESET* to return to the basic scan parameters stored for the current active probe. The factory default presets at the time of shipment are:

Probe	Depth	Gain	Focus	DR	Contrast Map	Frame Averaging
C36	150mm	50dB	60mm	54dB	3	25%
C55	150mm	50dB	60mm	54dB	3	25%
E72	75mm	50dB	40mm	54dB	2	25%
L76	75mm	50dB	30mm	54dB	3	25%
C31	150mm	50dB	60mm	54dB	3	25%
VE5	100mm	50dB	60mm	54dB	3	25%

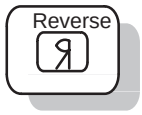
Table 7. Factory Default Presets

Mode Selection – B-Mode, Near Gain – 0, Far Gain – 0, Image Reverse/Inverse – Normal.



NOTE: Preset parameters can be set by pressing the Control–W key.

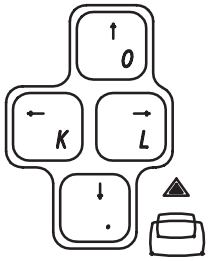
Image Reverse/Image Inverse Key



Press *REVERSE* key to reverse the image from Left to Right. Press a second time to reverse the image from Right to Left.

Press SHIFT + *REVERSE* to invert the image from Top to Bottom. Press a second time to invert the image from Bottom to Top.

Scroll



SCROLL ←, →,↑,↓ enables scrolling the live image Left/Right, Up/Down on the Display in B-Mode. Scrolling Up/Down in M-Mode is also possible. Scrolling Left/Right in M–Mode is not possible.



NOTE: Scrolling is disabled when FREEZE is on. The maximum depth for scrolling is upto 20 cms.

Freezing an Image

Freezing a real-time image stops all acquisition of information into system memory. This allows for measurements, annotations and printing.



Press *FREEZE* to freeze an image. The LED lights. To reactivate the image, press *FREEZE* again.



Toggle *FREEZE* (Foot switch option) on and off by pressing the footswitch. The freeze LED button lights up on the console.



NOTE: Deactivating Freeze erases all measurements and calculations from the display (but not from the report page). Selecting a new probe unfreezes the image.

Annotating the Image



When *COMMENT* is pressed, the cursor appears. Move the cursor using the trackball anywhere on the image and use alphanumeric keys to enter comments. (Press CONTROL–C to set Home position of cursor, if required). Press *RETURN* to move to the next line. Press *COMMENT* again to terminate the function.

Erasing Annotations

Use *BACKSPACE* to erase individual characters to the left of the cursor. Comments also get erased at power off or when *CLEAR* or *NEW PATIENT* are pressed.

Body Patterns



An additional way to annotate the image display is with body patterns. Body patterns are a simple graphic of a portion of the anatomy that is frequently scanned.

Body pattern is generally displayed in the lower left corner of the screen. Its placement can vary with the format of the display. eg. Dual B-Mode.

Along with the body graphic is a marker that illustrates the probe position. This marker can be moved with the *TRACKBALL* and rotated with the *LEFT/RIGHT* keys or the *GAIN/ROTATE* knob (only when the *FREEZE* key is activated). The body pattern and probe marker can serve as a reference for patient and probe positioning.

Selection Key



Press the *SELECTION* key to select the Body Pattern menu. The default Body Pattern Package is the OB/GYN package.

Abdomen Body Patterns



Illustration 20. Abdomen Body Pattern Selections

1. SUP Supine
2. LFT Left Side
3. RGT Right Side
4. LOB Left Oblique
5. ROB Right Oblique
6. PRN Prone
7. BRS Breast
8. NEC Neck
9. LMA Left Mammo
0. RMA Right Mammo

Selection Key (cont'd)

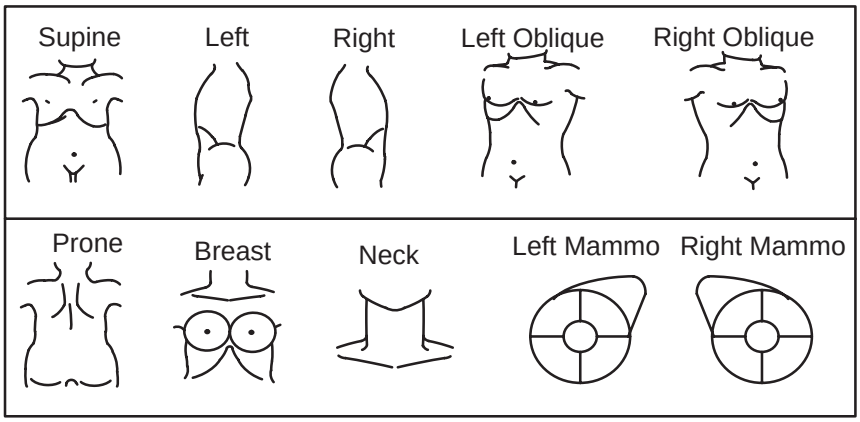


Illustration 21. Abdomen Package

OB/GYN Body Patterns



Illustration 22. OB/GYN Body Pattern Selections

1. MAMA — OB Patient
2. FTS1 — Fetus 1
3. FTS2 — Fetus 2
4. FTS3 — Fetus 3
5. FTS4 — Fetus 4
6. FTS5 — Fetus 5
7. UTRS1 — Uterus 1
8. UTRS2 — Uterus 2

Selection Key (cont'd)

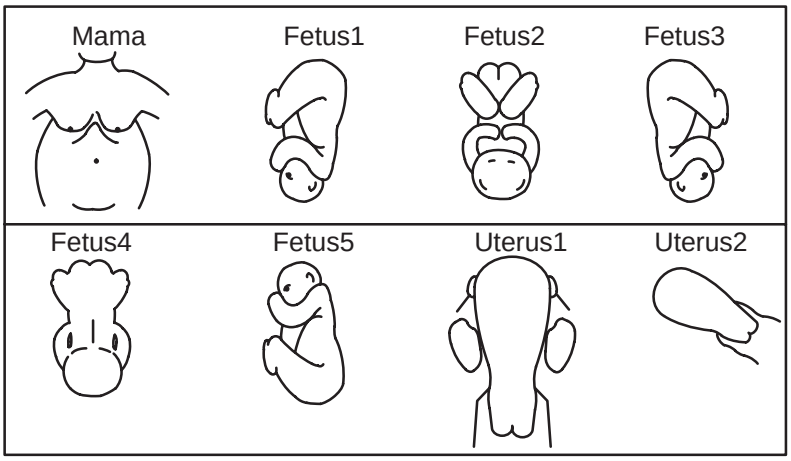


Illustration 23. OB/GYN Package

Veterinary Body Patterns

The following Veterinary body patterns are available for Veterinary scans.

1. DG_SUP Dog Supine
2. DG_R Dog Right
3. DG_L Dog Left
4. CT_SUP Cat Supine
5. CT_R Cat Right
6. CT_L Cat Left
7. CW_UT Cow Uterus
8. CW_R Cow Right
9. CW_L Cow Left
10. HR_UT Horse Uterus
11. HR_R Horse Right
12. HR_L Horse Left
13. HR_FT Horse Front
14. HR_RR Horse Rear

Selection Key (cont'd)

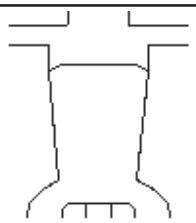
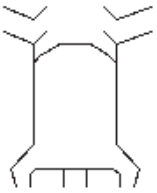
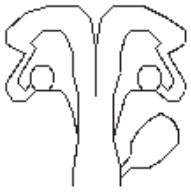
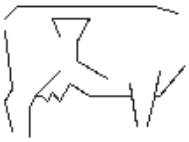
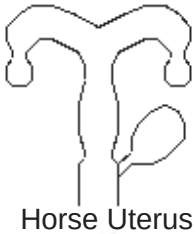
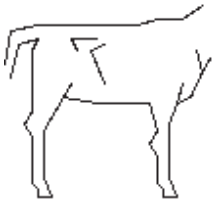
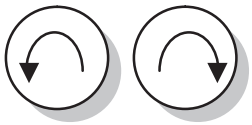
 Dog Supine	 Dog Right	 Dog Left
 Cat Supine	 Cat Right	 Cat Left
 Cow Uterus	 Cow Right	 Cow Left
 Horse Uterus	 Horse Right	 Horse Left
 Horse Front	 Horse Rear	

Illustration 24 Veterinary Package

Selection Key (cont'd)

NOTE: Pressing the SELECTION key at the end of each menu (Abdomen, OB/GYN or Veterinary) takes you to the next Body Pattern Package automatically.

Rotate Keys



Use the *LEFT/RIGHT* keys to adjust scan probe marker angle within the selected Body Pattern. 30° rotation per step is possible.

The *GAIN/ROTATE* knob can be used to adjust scan probe marker angle only when the *FREEZE* key is activated.

Use the *TRACKBALL* for probe marker location.

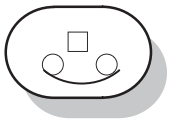
VCR Operations

Overview

An optional video cassette recorder is available for the LOGIQ™ α100. The optional VCR is the Sony SVO–9500MD.

CAUTION Use only approved probes, peripherals or accessories. Please refer to the Service Manual (2139768) for more information about Peripherals/Accessories and their connections.

External Video



Press the *EXTERNAL VIDEO* key to enable an external video (i.e. VCR Playback) to be viewed on the LOGIQ™ α100 system monitor.

Record



Press the *RECORD* key to record the image which is on the display monitor. It can be used to trigger a videographic printer. In the Report Page, fields ‘Report Date’ and ‘Reported by’ are printed in reverse video to enable the doctor to edit those fields.

NOTE: SHIFT + RECORD can be used to print the current Report page on a printer by connecting it to the RS-232C serial port on the rear panel.

RS–232C Port shall be used with GE supplied cable only.
Refer SV Manual 2139768 Section System Configuration for RS–232C Pin out and, Section Renewal parts for the Part number of the cable to be used.

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Two Probe Port (Option)

Description

Right Side View

The two probe port option is an additional module that serves as an interface to attach two probes to the single probe capable LOGIQ a100 unit. It enables users to change between two probes without disconnecting and connecting the probes. If frequent probe switching is necessary, the two probe port saves scan time and wear on the probe connector. It consists of the following parts.

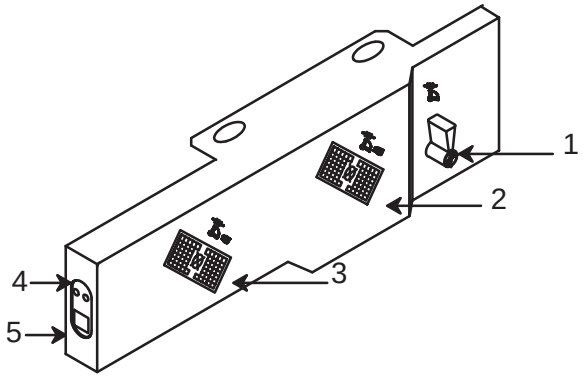


Illustration 25. Right side view of two port probe

1. **Two Probe Port lock:** A lever that fastens the two probe port to the system.
2. **Port 2:** Probe 2 connector.
3. **Port 1:** Probe 1 connector.
4. **LED** (Light Emitting Diode) Indicates the active port (1 or 2)
5. **Switch:** A press key type of switch to change between probes

Left Side View

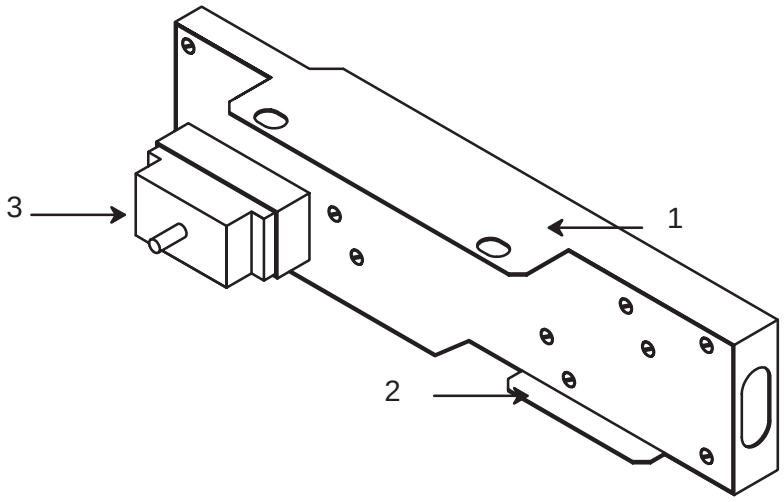


Illustration 26. Left Side View of Two Probe Port

1. **Upper Flange:** Used for support in securing the two probe port module. The two holes on the top should be aligned with the projection at the bottom of the probe holder.
2. **Lower Flange:** Together with the upper flange the two probe port is secured tightly to the system.
3. **Two probe port connector:** The part which attaches to the LOGIQ a100 probe port.

Orientation of the Two Probe Port Module on the system

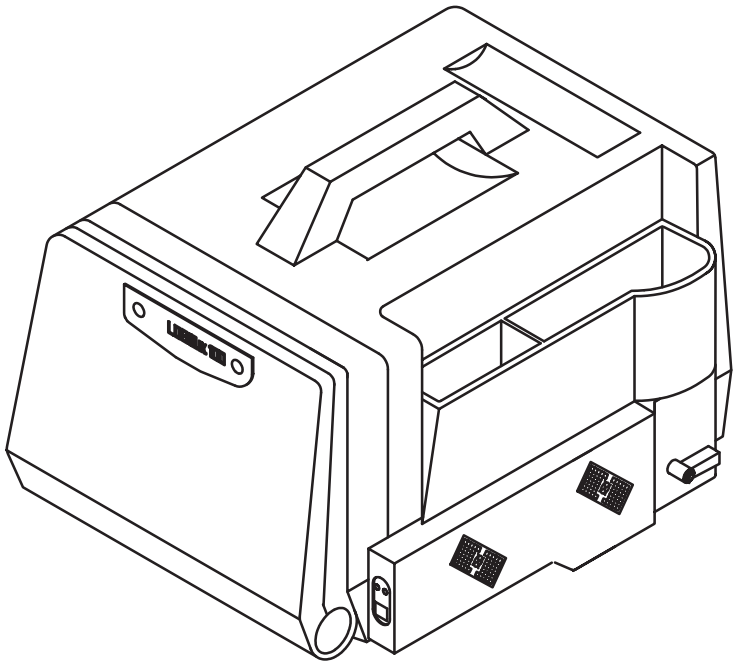


Illustration 27. Orientation of the Two Probe Port module on the system.

The Two Probe Port module should be connected only in the above mentioned orientation.

Connecting the Two Probe Port

The two probe port module can be connected or disconnected at any time regardless of whether the system is powered ON or OFF.

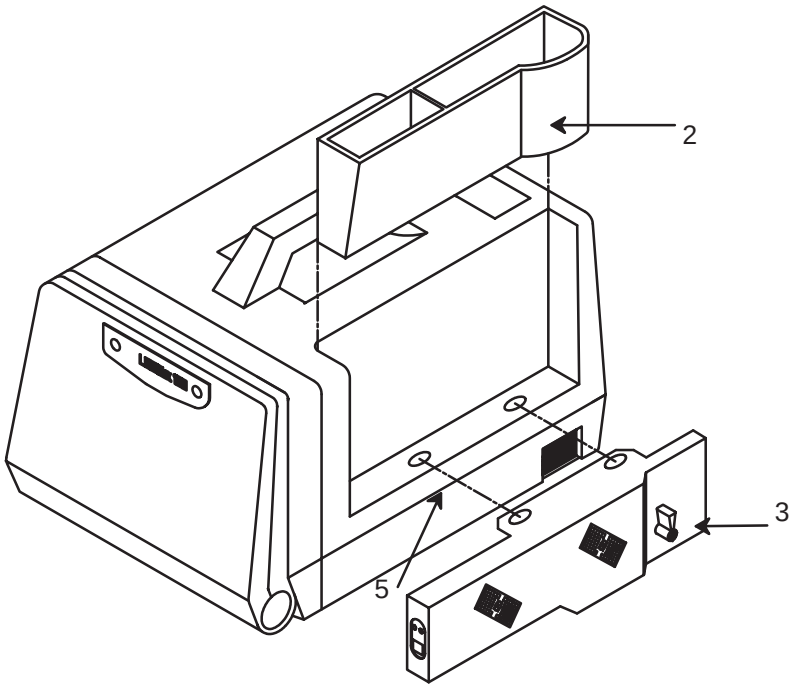


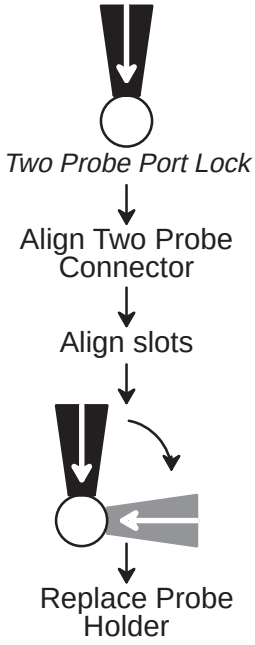
Illustration 28 Connecting the Two Probe Port

Remove Probe Holder

1. Ensure that no probe is connected to the system.
2. Remove the Probe Holder by lifting it vertically.

↓
cont'd

Connecting the Two Probe Port (cont'd)



3. Ensure that the Two Probe Port Lock points to the 12 o'clock position.
4. Align the Two Probe Connector with the System Probe Port and carefully push in place.
5. Align the slots on the upper flange to its counterparts on the system.
6. Turn the Two Probe Port Lock to the 3 o'clock position to secure the Two Probe Port to the system.
7. Carefully replace the probe holder to its place and press firmly till the projections at the bottom fit into the slots in the upper flange and the system.

The Two Probe Port has now been secured and is ready for use.

Connecting Probes to the Two Probe Port Option

Probes can be connected or disconnected from the Two Probe Port module at any time regardless of whether the system is powered ON or OFF.



1. Carefully unwrap the probe cord.
2. Hold the probe connector lock in the 12 o'clock position as indicated the arrow pair.
3. The probe can be connected to either of the port.
4. The probe connector should be oriented in such a way that the probe cord points upwards and forwards as shown in Illustration 29.

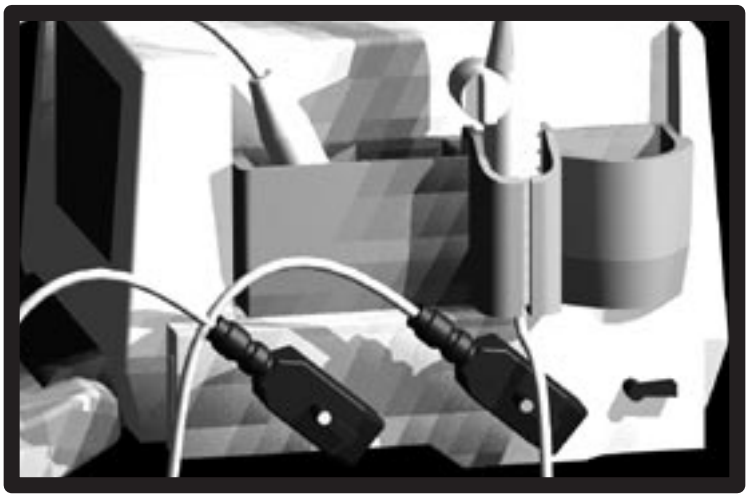


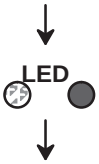
Illustration 29. Orientation of the probe connectors on the Two Probe Port module.

Connecting Probes to the Two Probe Port (cont'd)



5. Align the connector with either of the ports and carefully push in place.
6. Turn the probe connector lock in the clockwise direction through one quadrant. The connector is now secured to the two probe port.
7. Carefully position the probe cord such that it is not put to undue stress.
8. Press the Switch key on the Two Probe Port to switch to the connected port.





The LED toggles to indicate the probe change.

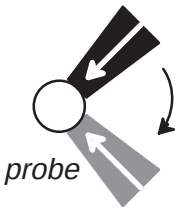
audible click

A click is also heard to indicate the switch over.



NOTE: Inadvertent pressing of the switch key  *when only one probe is connected causes the system to toggle ports and any captured image will be lost.*

Connecting a Second Probe



A second probe can be connected or disconnected at any time regardless of whether the system is powered ON or OFF (frozen or real time).

Connect the second probe to the empty port following the same steps mentioned above.

Once the second probe is connected the Two Probe Port senses the connection and initializes the system.

WARNING Ensure that the following information in any previously scanned image is captured:

- Anatomical Details
- On screen measurements
- Comments

As the Two Probe Port senses the connection and the system initializes the above mentioned data will be lost.

The following data is retained even after the automatic connection.

- Patient ID
- Patient Name
- Patient report page
- All previous obstetric measurements, calculations and comments that have been incorporated in the report page

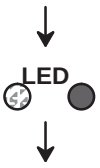
Switching Probes

The Two Probe Port offers the advantage of switching probes with the simple press of a key.
Switching probes can be done in frozen or live B, B/B, B/M and M–Modes.

Before switching ensure that the precautions mentioned on page 92 are heeded.



Press the Switch key on the Two Probe Port.



audible click

The LED toggles to indicate the probe change.
A click is also heard to indicate the switch over.

The system initializes the newly selected probe and the image from the newly selected probe is displayed in B–Mode.

To change probes again simply press the switch key.

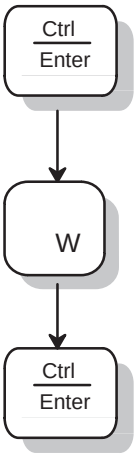
Presetting Parameters to a Probe

Scan parameters like gain, depth etc. can be preset for each probe. Establishing preset parameters for each probe, provides the user with a desired optimum starting point for imaging with a specific probe.

The following parameters can be preset to a probe.
- Gain
- Dynamic Range
- Focus
- Image Direction, (Right/Left, Top/Bottom)
- Depth
- Gray Scale Map Curve
- Near Gain
- Far Gain
- Frame Averaging Values

To preset parameters first select the desired probe by pressing the select switch.

Adjust the above mentioned parameters to their optimal values at the beginning of a scan.



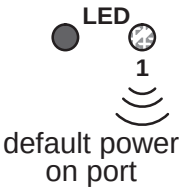
Press *CONTROL*

Press *W*

Press *ENTER* to save the preset values.

Repeat the sequence for additional probes. Whenever the probe is selected the preset parameters are set to the default values.

Power ON with Two Probe Port



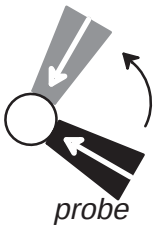
default power on port

To switch on power Press the ‘I’ (ON) position of the power on switch (for further details refer illustration 5 on page 20.

Port 1 is selected as the default active port on power ON. The corresponding LED glows.

Disconnecting a Probe from the Two Probe Port

Probes can be disconnected from the Two Probe Port module irrespective of whether the system is **ON** or **OFF**.


probe

To disconnect a probe move the probe connector lock counter–clock wise through ninety degrees.

Pull Probe

Pull the probe connector straight out of the probe port.

Store Probe

Properly clean the probe and place in a secure place.

Probes can be disconnected from the Two Probe Port irrespective of whether the probe is **active** or **inactive.**

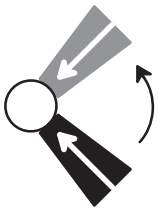

Hints

Removal of the inactive probe has not impact on the active scan.

Disconnecting the Two Probe Port

The Two Probe Port module can also be disconnected from the system with power ON.

Disconnect probes if attached and place them in a secure place.

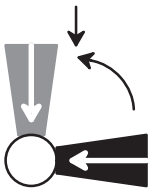


probe

Remove the probe holder as described in page 88.

Remove Probe Holder

Turn the Two Probe Port Lock to the 12 o’clock position. Pull the Two Probe Port straight out of the system probe port.



2 probe port lock

Place the Two Probe Port in a secure place.

General Measurements

Basic Measurements

This section describes the General Measurements available that are not specific to an exam category.

The basic measurements available depend on the mode of operation when the measurement key is pressed.

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Basic Measurements

Overview

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurements are not only determined by system accuracy, but also by the use of proper medical protocols by the user. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigations are noted. Please refer to the original article describing the investigators recommended clinical procedures.

Basic Measurements are made after the image is captured and frozen.

General Instructions

Distance measurements can be made in all modes and image formats, including real-time or frozen. However always freeze the image before making a measurement to avoid wrong results.
Trace measurement can be made only in a B–Mode areas.
Ellipse measurement can be made in only in the B–Mode area and in the frozen state.

Up to 4 measurement values are updated on the display at one time. Record all desired measurements displayed on the screen before erasing them.

Measurement Accuracy

The following information is intended to provide guidance to the user in determining the amount of variation or measurement error that should be considered when performing clinical measurements with this equipment. Error can be contributed by equipment limitations and improper user technique. Be sure to follow all measurement instructions and develop uniform measurement techniques among all users to minimize the potential operator error. Also, in order to detect possible equipment malfunctions that could affect measurement accuracy, a quality assurance plan should be established for the equipment that includes routine accuracy checks.

Measurement	Accuracy	Range
Depth	± 1mm	Full screen
Distance	± 1mm	Full screen
Circumference • Trace • Ellipse	± 1mm	Full screen
Area • Trace • Ellipse	± 1mm^2	Full screen
Time (seconds)	± 5%	Time Line Display

Table 8. Measurement Accuracy

Distance and Circumference measurements are displayed in mm and Area measurements in cm^2 .

Erasing Measurements

The following actions erase measurements from the system's memory:

- If the Measurement has not been completed**,** pressing *CLEAR* once clears the current measurement and the open ended cursor appears on the screen. Pressing *CLEAR* a second time clears the open ended cursor. Pressing *CLEAR* a third time clears all measurements on the screen and exits out of the Measurement menu.
- If the Measurement is complete, pressing *CLEAR* once clears all data from the display and exits out of the Measurement menu.
- Pressing *NEW PATIENT* twice erases all measurements and calculations on the display and clears the report pages.
- Adding a new measurement that exceeds the maximum number of allowable measurements erases the oldest measurements.

Measurement Key

The type of measurement depends on the current scan mode and the number of times the *MEASUREMENT* key is pressed. If the *MEASUREMENT* key is pressed, the >< open ended cursor will toggle between Distance Measurement and trace. In the Distance mode, an open ended calliper appears (><) and in the trace mode a dot cursor appears (⊙).

Cursors

Once the measurement sequence is complete, the cursor symbol changes to one of the seven symbols shown below.



Illustration 30. Cursor Illustrations

General Measurement Menu

The general measurement menu is common to all diagnostic categories (for further details on diagnostic category please refer page 125).



To invoke the general measurements menu press *MEASUREMENT* key in B, B/B, B/M or M–Modes.

The general measurement menu appears at the bottom of the screen.

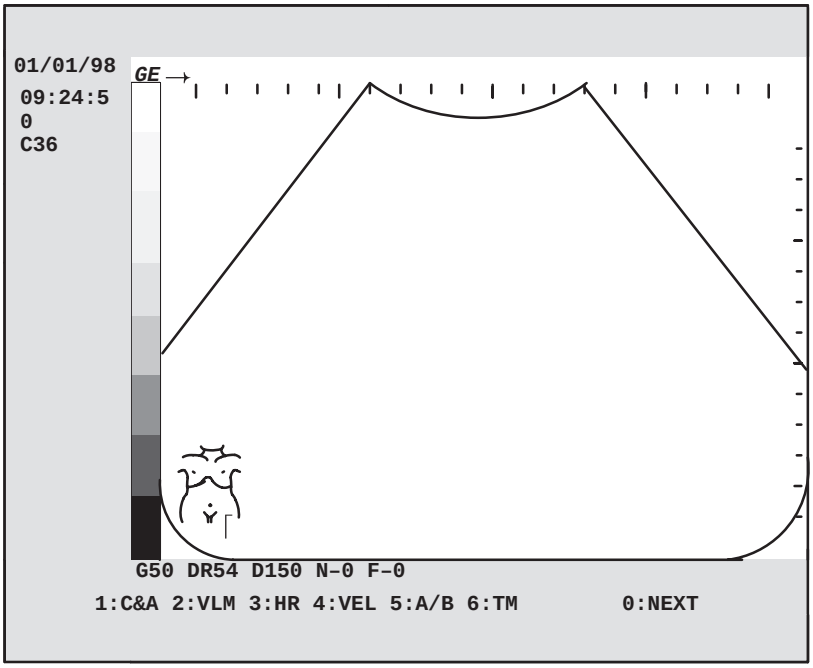
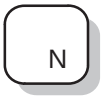
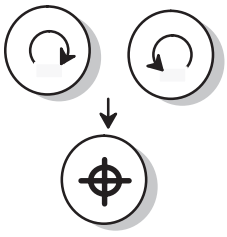


Illustration 31. The General Measurement Menu on Screen.



To select an item select the appropriate *NUMERIC* key.

OR



Select the *ROTATE* keys and press *SET.*

Distance Measurement

Distance Measurements are made in the B-Mode portion of the image. To make a distance measurement:



Press *FREEZE* to stop image acquisition. (It is not mandatory while making a distance measurement).



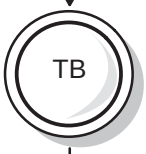
Press the *MEASUREMENT* key once to display the General Measurement Menu. Simultaneously an open ended "><" cursor appears on the screen.



Use the *TRACKBALL* to move the open ended "><" cursor to the measurement start point.



Press *SET* to fix the measurement start point cursor and to display a second cursor. Distance in mm appears on the left side of the screen.



Use the *TRACKBALL* to move the second open ended "><" cursor to the measurement end point.



Press *SET* to complete the measurement. The Distance value is displayed in mm on the left of the screen. Repeat the same procedure to make more Distance Measurements, if required. ***Up to 4 measurements will be displayed in mm at a time***.

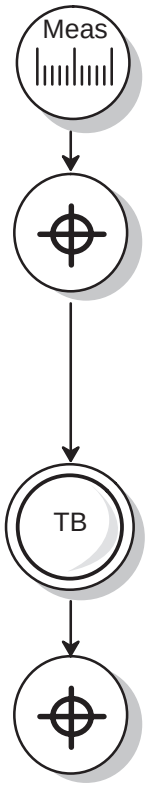


Hints

To enable the already fixed cursor to become active, press the *MEASUREMENT* key; the fixed cursor becomes active and the currently active cursor becomes fixed.

*Distance Measurement in B/A Mode

Distance Measurements are typically made in the B-Mode portion of the image. However, a second distance measurement can be made in A–Mode



Press the *MEASUREMENT* key once to display the measurement menu and an open ended "><" cursor appears at the start (top left corner) of the A Image. Motion of the first cursor is not allowed in A Image area. In the B Image area the first cursor behaves normally.

Press *SET* to fix the measurement start point cursor (top left corner of A Image), a second cursor appears in the A Image. Distance in mm appears on the left side of the screen. The Amplitude and the Depth of the second cursor is displayed at the bottom right corner of A Image area. The range of Amplitude displayed is from 0 to 99 for all depths.

Use the *TRACKBALL* to move the second open ended "><" cursor to the measurement end point.

Press *SET* to complete the measurement. The Distance value is displayed in mm on the left of the screen. The Amplitude and the Depth of the second cursor is displayed at the bottom right corner of A Image area. Repeat the same procedure to make more Distance Measurements, if required. ***Up to 4 measurements will be displayed in mm at a time***.

A/B ratio is the only calculation that is allowed in the A Image area. The 'Y' offset values (displayed in the Distance form) is used for the ratio calculation. Invoking HR, VEL or VOL measurements will cause the system to beep and an ILG message is displayed.

Hints

Toggling between cursors is not possible on pressing *MEASURE*.

*****Applicable only for systems delivered in India.

Circumference/Area Measurement

Circumference and area can be measured by three methods:

- two distance method
- ellipse method
- trace method.

Two Distance Method

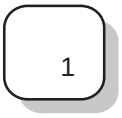
Scan to obtain a section of the anatomical organ whose circumference/area is to be measured.



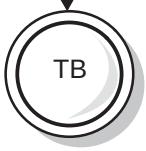
Press *FREEZE* to stop image acquisition.



Press the *MEASUREMENT* key once to display the General Measurement Menu. An open ended "><" cursor appears on the screen.



Press 1
The circumference and area will be calculated and displayed after completion of two measurements.



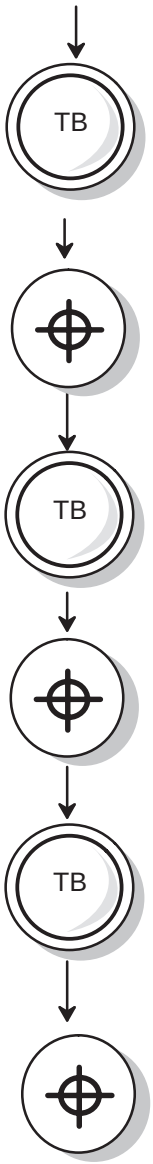
Use the *TRACKBALL* to move the open ended "><" cursor to either end of the first axis of the area to measure.



Press *SET* to fix the start point cursor. Distance in mm appears on the left side of the screen.

continued

Two Distance Method (cont.)



Use the *TRACKBALL* to move the second cursor to the measurement end point.

Press *SET* to fix the end point of cursor. The distance measured by this pair of calipers appears on the left side of the screen. Simultaneously a second open ended "⊞" cursor appears on the screen.

Use the *TRACKBALL* to move the open ended "⊞" cursor to either end of the second axis of the area to measure.

Press *SET* to fix the start point cursor. Distance in mm appears on the left side of the screen.

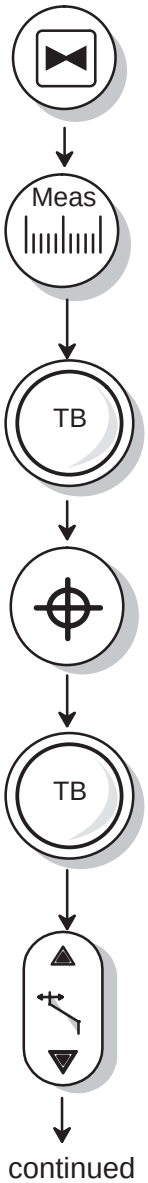
Use the *TRACKBALL* to move the second "⊞" cursor to the measurement end point.

Press *SET* to fix the end point of cursor.
The circumference and area is calculated and displayed on the left side of the screen.

Should further measurements need to be taken, press *SET* again to invoke a fifth cursor and follow the procedure above.

Four Circumference/Area measurements can be displayed at the same time.

Ellipse Method



An ellipse can be used to measure the circumference and area of an organ.

To measure the Circumference/Area with an ellipse:

Press *FREEZE* to stop image acquisition.

Press the *MEASUREMENT* key once to display the measurement menu and an open ended "><" cursor appears on the screen.

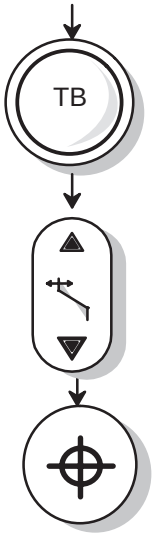
Use the *TRACKBALL* to move the open ended "><" cursor to either end of the axis of the area to measure.

Press *SET* to fix the start point cursor. Distance in mm appears on the left side of the screen.

Use the *TRACKBALL* to move the second cursor to the measurement end point.

Press the *NEAR (ELLIPSE)* up/down key, an ellipse having an initial circle shape appears.

Ellipse Method (cont.)



Use the *TRACKBALL* to position the ellipse, as necessary, and to size the active axis.

Press the top of the *NEAR (ELLIPSE)* key to increase the size of the inactive axis.
Press the bottom of the *NEAR (ELLIPSE)* key to decrease the size of the inactive axis.

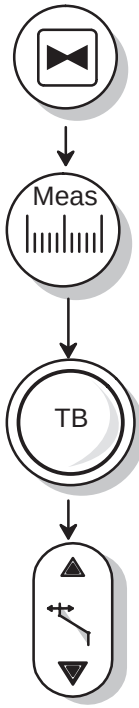
Press *SET* to complete the ellipse measurement and record the circumference and area.
Four Circumference/Area measurements can be displayed at the same time.



Hints

Use the *MEASUREMENT* key to change the axis of activation of the measurement cursors.

Alternate Ellipse Method



Press *FREEZE* to stop image acquisition.

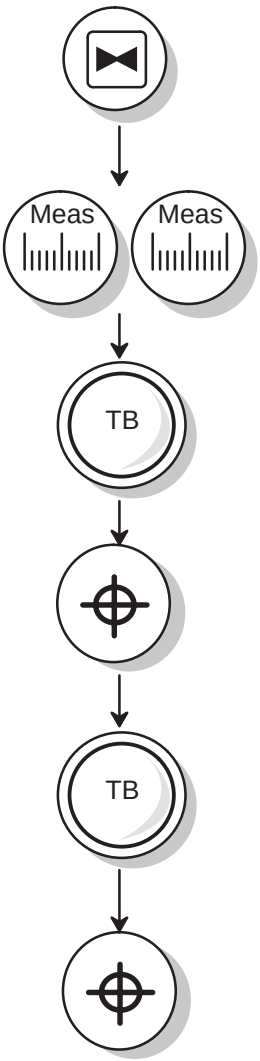
Press the *MEASUREMENT* key once to display the measurement menu and an open ended "><" cursor appears on the screen.

Use the *TRACKBALL* to move the open ended "><" cursor to either end of the axis of the area to measure.

Press the *NEAR (ELLIPSE)* up/down key, an ellipse having an initial circle shape appears. Make ellipse adjustments as previously described as necessary.

Trace Method

To trace the circumference of a portion of the anatomy and calculate its circumference and area:



Press *FREEZE* to stop image acquisition. (It is not mandatory while making a trace measurement).

Press *MEASUREMENT* twice to display a dot " " cursor on the screen.

Use the *TRACKBALL* to move the dot " " cursor to the measurement start point.

Press *SET* to start the trace and fix the start point. The display on the left side of the screen shows the circumference in mm and Area in cm^2.

Use the *TRACKBALL* to trace the measurement area. The circumference displayed on the left of the screen will change with the tracing.

Press *SET* to fix the Circumference value displayed on the left of the screen and calculate the area in cm^2. Repeat measurements by following the same procedure. **Four Circumference/Area measurements by trace method can be displayed at the same time.**

NOTE: Even if the trace is incomplete, pressing SET a second time will cause a straight line to automatically join the start and end points of the trace.

Volume Measurement

Overview

Volume is the physical space occupied by a tissue or organ. It is expressed in cm^3.

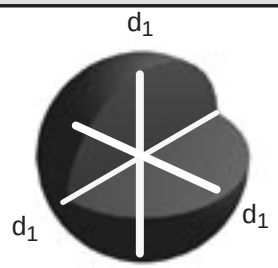
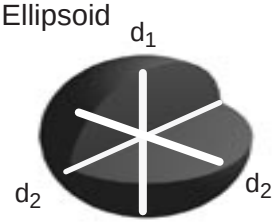
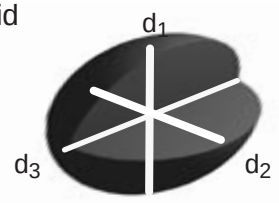
To sonographically measure the volume of an arbitrary shaped tissue/organ, it needs to be approximated to a geometric model. Three geometric models are available as shown in Table 9.

Model	Formula
Spherical	$Vol = \frac{\Pi \times d^3}{6}$
Prolate Spheroid	$Vol = \frac{\Pi \times d_1 \times d_2{}^2}{6}$
Spheroidal	$Vol = \frac{\Pi \times d_1 \times d_2 \times d_3}{6}$

Table 9. Geometric Models Supported in LOGIQ™ α100.

Overview (cont.)

The system automatically chooses the model based on the number of measurements provided.

Measurement Provided	Model Chosen
1 distance	Sphere 
2 distance OR 1 ellipse	Prolate Ellipsoid 
3 distance OR 2 distance and 1 ellipsoid OR 1 distance, 1 ellipsoid OR 2 ellipse	Spheroid 

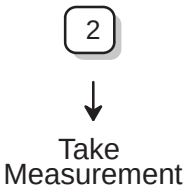


Hints

- When an ellipse is provided to measure volume the system takes the long and short axes of the ellipse to calculate volume.
- When two ellipses are provided for volume measurement, the system uses the long and short axes of the first ellipse and the first axis of the second ellipse to calculate volume. The second axis of the second ellipse is not used in the calculation as it is equal to one of the axes of the first ellipse.
  NOTE: Proper understanding of this system behavior is necessary to prevent obtaining wrong results in calculation of volume using two ellipse measurements.

Pre and Post Selection Procedures

Two measurement procedures, Post Selection and Pre Selection, are available to suit individual preference of measurement style.

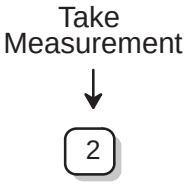


Post Selection : Post selection is invoked by selecting *VOLUME* first and then taking the measurements. When all three measurements are completed the system automatically calculate and displays the volume using the Spheroid formula.

If volume is to be measured with less than three measurements pressing *CLEAR* will calculate the volume with the available measurements using the appropriate model as explained on page 111.

Pressing *CLEAR* a second time erases measurements.

Unfreezing the images does not erase previous measurements.



Pre Selection : The user takes the necessary number of measurements and then selects *VOLUME*. The formula used for volume calculation depends on the number of measurements provided as explained on page 111.

It several distances have been measured and *VOLUME* is invoked, the last three measurement will be used for calculation of volume.

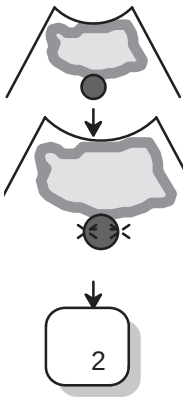


Unfreezing the images erases previous measurements.

Measurement of Volume by approximation to a Sphere (One Distance Method)

This method is appropriate for structures having radial symmetry.

Pre Selection

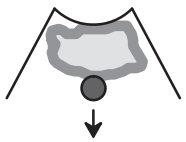


Scan and obtain a cross section of the structure the volume of which is to measured.

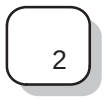
Measure the diameter. (For details of distance measurement please refer page 103).

Press 2
The volume is calculated and displayed on the left side of the screen in the calculation result area. The measurement d_1 used in the calculation is also displayed.

Post Selection

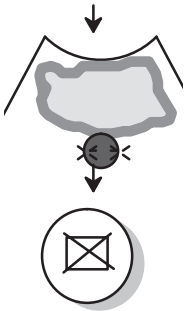


Scan and obtain a cross section of the structure the volume of which is to measured.



Press *2*. The `2:VOL` item gets highlighted.





Measure the diameter. (For details of distance measurement please refer page 103).

Press *CLEAR*. The volume is calculated and displayed on the left side of the screen in the calculation result area. The measurement d_1 used in the calculation is also displayed.

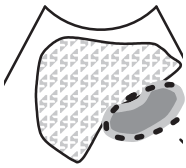
Measurement of Volume by approximation to a Prolate Spheroid (Two Distance Method)

This method is appropriate for structures that are bilaterally symmetrical.

Pre Selection



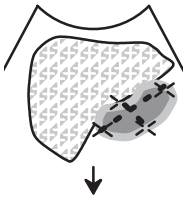
Scan and obtain a longitudinal section of the organ.



Construct an ellipse to approximate the outline (For details on constructing an ellipse please see page 107).

OR

OR



Measure its long and short axes using distance method.



Press *2.* The volume is calculated using the prolate spheroid formula and displayed in the calculation result area. The distances d_1 and d_2 used in measurement are also displayed.



Hints

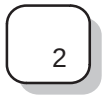
The cross section and longitudinal section can be displayed side by side on B/B image.

Measurement of Volume by approximation to a Prolate Spheroid (Two Distance Method) (cont.)

Post Selection

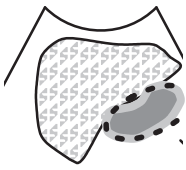


Scan and obtain a longitudinal section of the organ.



Press 2.
The item 2:VOL gets high lighted.

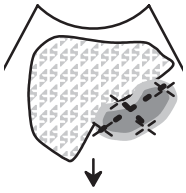
2:VOL



Construct an ellipse to approximate the outline (For details on constructing an ellipse please see page 107). The distances d_1 and d_2 are displayed on the side.

OR

OR



Measure its long and short axes using distance method. The axes of the ellipse are displayed as d_1 and d_2 on the side.



Press *CLEAR.*
The volume is calculated using the prolate spheroid formula and displayed in the calculation result area.



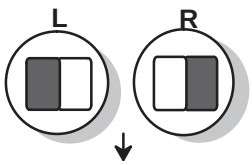
Hints

Unfreezing the image does not erase measurements.

Measurement of Volume by approximation to a Spheroid (Three Distance Method)

This formula is suited for anatomical structures that are arbitrarily shaped and do not conform to radial or bilateral symmetries.

Pre Selection



Using the *LEFT/RIGHT* keys scan and obtain a section of the organ in a B/B image. For details of using the B/B image please refer page 71.

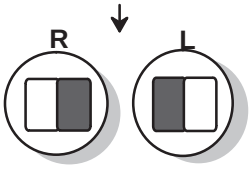


Measure its long and short axes by distance method.

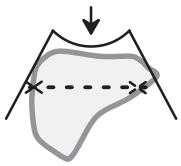
OR



OR
Construct an ellipse to approximate its outline.



Turn the probe through 90° and obtain another section. Press the *RIGHT/LEFT* keys to freeze in the second B/B image. For details refer page 71.

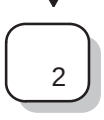


Measure the third axis.

OR



OR
Construct an ellipse to approximate the outline.
NOTE: Of the two axes of the second ellipse displayed on measurement area on the side, ensure that the third axis is always on the left. To swap the axes press measurement key.



Select *2*. The volume is calculated and displayed in the calculation result area. Distances d_1,d_2,d_3 used in calculation are also displayed.

Measurement of Volume by approximation to a Spheroid (Three Distance Method) (cont.)

Post Selection



Scan and obtain a frozen section of the organ.
Press 2.
The item 2:VOL gets high lighted.

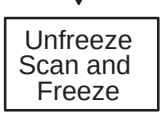


Measure its long and short axes by distance method.
Distances d_1 and d_2 are displayed on the left side.

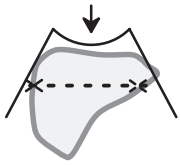
OR



OR
Construct an ellipse to approximate its outline.
Distances d_1 and d_2 are displayed on the left side.



Turn the probe through 90° and obtain a second section.
Press *FREEZE* to capture the image.



Measure the third axis. Distances d_3 is displayed on the left side.
(For further details on distance measurement please refer page 103).

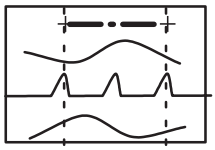
OR



OR
Construct an ellipse to approximate the outline.
Distances d_3 is displayed on the left side.(For details on constructing an ellipse please see page 107).
NOTE: Of the two axes of the second ellipse displayed on measurement area on the side, ensure that the third axis is always on the left. To swap the axes press measurement key.

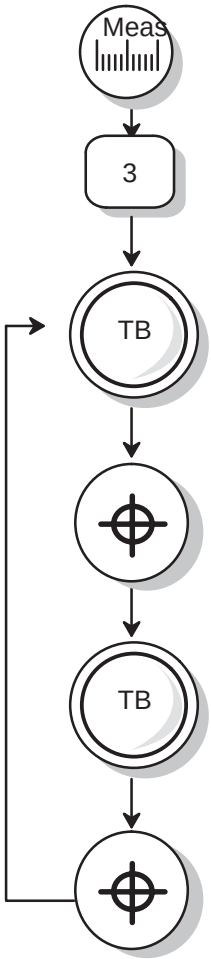
The Volume is automatically calculated and displayed on completion of the third measurement.

Heart Rate measurement



HEART RATE in beats per minute is calculated by measuring the interval between 2 heartbeats in the *M-Mode or B/M-Mode.* If calculations are done in the wrong mode an error message HR ILG will appear in the Calculation Result Area. Four Heart Rate calculations can be displayed in the Calculation Result Area of the Display

$$HR = \frac{60}{Elapsed\ time} \times 2$$



Press the *MEASUREMENT* key once to display the measurement menu and an open ended "><" cursor appears on the screen.

Select *3*.
If the appropriate measurement was already performed the Heart Rate is calculated and displayed.

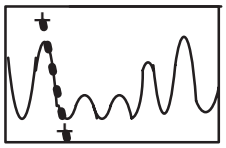
Use the *TRACKBALL* to move the M-Mode measurement cursor to the start point of measurement.

Press *SET* to fix the start point. A second M–Mode measurement cursor appears.

Use the *TRACKBALL* to move the cursor to the same point on the M–Mode trace, two heart beats from the starting point.

Press *SET* to fix the end point. The heart rate is displayed on the left side of the screen in beats per minute. Press *SET* a second time to repeat procedure for more measurements. **Four measurements can be displayed at the same time.**

Velocity Measurement



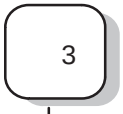
Velocity of a moving structure is the rate of change of its displacement. It is determined by placing an arbitrary line tangent to the steepest slope of the structure in a M–Mode trace and measuring its slope which is equal to the velocity of the structure. It is expressed in meters per second.



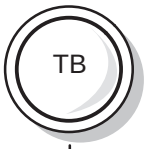
As in all M–Mode measurement freeze before performing any measurement.



Press *MEASUREMENT* to display the General Measurement Menu. Simultaneously an open ended "><" appears on the screen.



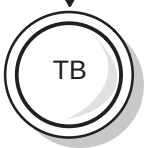
Select [3].
If the appropriate measurement was already performed the Velocity is calculated and displayed.



Use the *TRACKBALL* to move the open ended "><" cursor to a point tangential to the steepest slope of the M–Mode trace.



Press *SET set* to fix one end of the line. A second cursor and a dotted line appears.



Use the *TRACKBALL* to move the second open ended "><" cursor to a point such that the dotted line is tangential to the steepest slope of the M–Mode trace of the structure of interest.



Press *SET*. The velocity of the structure is displayed at the right side off the screen.
Up to four measurements values can be displayed on the screen.

A/B Ratio

A/B ratio calculates the ratio between two one dimensional measurements. The measurements supported are:

- distance
- circumference (measured by ellipse, trace or two distance method; for details of circumference measurements please refer page 105).

The numerator and denominator are such that

$$A/B = \frac{Second\ \ last\ \ measurement}{Last\ \ measurement}$$

The ratio can be calculated for distance/distance, circumference/circumference, distance/circumference and circumference/circumference.

Illustration: *Using A/B ratio you can calculate ratio between femur length (FL) to humerus length (HL) or FL to head circumference (HC) or HC to abdominal circumference.*

Take two one dimentional measurements

Take two one dimensional measurements whose A/B ratio needs to be calculated (ensure that the numerator is taken first).

↓

5

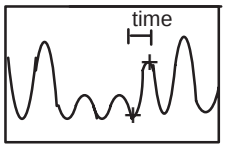
Select 5 in the menu.

1: C&A	2: VLM	3: HR	4: VEL	5: A/B	6: TM

A/B ratio is calculated and displayed in the calculation result area.

☞ *A/B measurements should have been made before selecting A/B ratio. It two measurements have not been previously made and error message will appear as NM.*

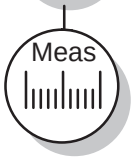
Time Measurement



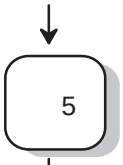
Time measurement is the duration of occurrence of an event of interest. It is expressed in seconds.
Time measurement can be performed only on the M–Mode screen.



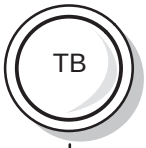
Freeze to stop image acquisition.



Press *MEASUREMENT* to display the General Measurement Menu. Simultaneously an open ended “><” appears on the screen.



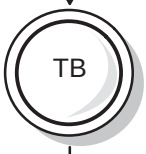
Select [5].
If the appropriate measurement was already performed the elapsed time is calculated and displayed.



Use the *TRACKBALL* to move the move the open ended “><” cursor to the time measurement start point.



Press *SET set* to fix the measurement start point. A second cursor appears.



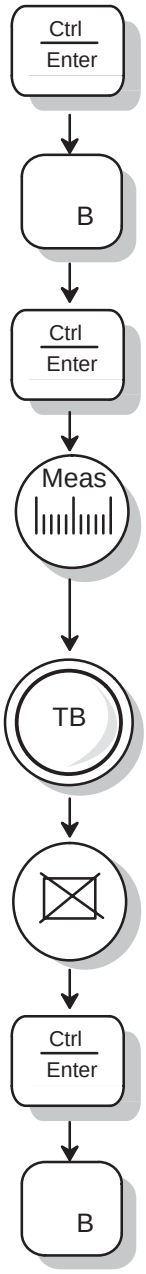
Use the *TRACKBALL* to move the second open ended “><” cursor to the measurement end point



Press *SET*. The time between the happening of the event in seconds is displayed.
Up to four measurements values can be displayed on the screen.

Biopsy Depth Measurement

To measure the desired depth for needle insertion during a biopsy:



Press *CONTROL B ENTER* or the alphanumeric key ‘B’ to turn the Biopsy Zone Display ON.

Press the *MEASUREMENT* key to invoke the biopsy depth. A dotted line appears in the middle of the zone and an open ended “><” cursor appears on this line. The position of the cursor gives the biopsy depth which is displayed on the left side of the image display.

Use the *TRACKBALL* to move the cursor along the center line. The biopsy depth values are computed and displayed on the left side of the image display.

Press *CLEAR* to exit out of the measurement mode.

Press *CONTROL B ENTER* or the alphanumeric key ‘B’ to exit the Biopsy Zone Display.

Diagnostic Category

Diagnostic Category

This section describes the ability to optimize numerous system settings to suit an anatomical organ at the touch of a key.

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Diagnostic Category

Overview

The acoustic impedance of anatomy varies widely. To obtain an optimal image, it is often a necessity to adjust a number of controls which is distracting and time consuming. Furthermore the numerous measurements and calculation options when present for all anatomical examinations, make movement from one item to another cumbersome.

To overcome these difficulties five diagnostic categories are supported for simple user selection:
1. Abdomen
2. Obstetrics
3. Gynecology
4. Cardiology
5. Urology.

Abdomen

Select this category to perform ultrasound examinations of abdominal organs. The features of this category are:

- System settings for optimal abdominal image quality.
- Measurement menu consisting of only the general measurement and OB measurement according to the current OB version.

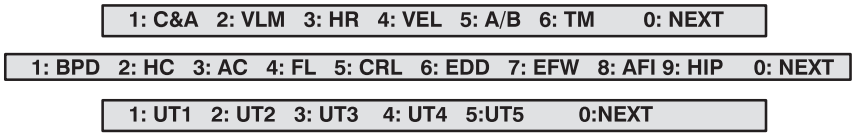




Obstetrics

Select this category for obstetric examinations. The features are:

- System settings for optimal fetal image quality.
- Measurement menu consisting of general, obstetric and user programmable OB table measurements.

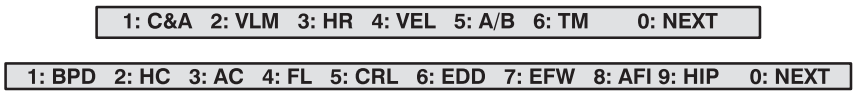


- Obstetric report page (for further details please refer to page 173).

Gynecology

Select this category to examine the female pelvis. The features are:

- System settings for optimal Gynecological image quality.
- Measurement menu consisting of only general and OB measurements.

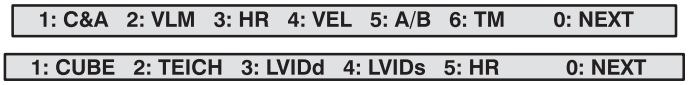


Cardiology

Select this category to perform echocardiographic examinations. The features are:

- System settings for optimal Echocardiographic image quality.
- Measurement menu consisting of general and cardiology measurements.

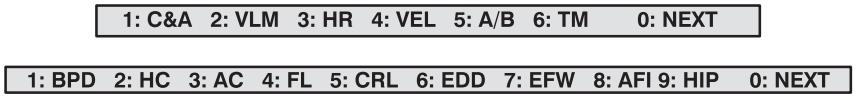
.



Urology

Select this category to perform urological examinations. The features of this category are:

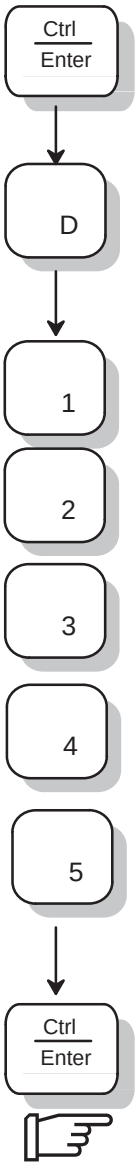
- System settings for optimal kidney, bladder and prostate image quality.
- Measurement menu consisting of only general and OB measurements.



- Urology report page (for details of urology report page refer to page 234).

Selecting a Diagnostic Category

The diagnostic category can be selected using the **CONTROL D** sequence.



Press *CONTROL*

Press *D* (Diagnostic Category)

Press *1* for Abdomen

Press *2* for Obstetrics

Press *3* for Gynecology

Press *4* for Cardiology

Press *5* for Urology

Press *ENTER*. The selected package becomes active.

All the body patterns are supported irrespective of the diagnostic category.

OB

Exam Preparation

OB Measurements

OB Report Page

OB User Table

This section describes the Obstetric sonographic Examination.

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Exam Preparation

Overview

Prior to an ultrasound examination, the patient should be informed of the clinical indication, specific benefits, potential risks, and alternatives, if any. In addition, if the patient requests information about the exposure time and intensity, it should be provided. Patient access to educational materials regarding ultrasound is strongly encouraged to supplement the information communicated directly to the patient. Furthermore, these examinations should be conducted in a manner and take place in a setting which assures patient dignity and privacy.

While procedures will be different for each facility, some suggestions are:

- Prior material knowledge and approval of the presence of nonessential personnel with the number of such personnel kept to a minimum.
- An intent to share with the patients, either during the examination or shortly thereafter, the information derived.

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OB Measurements

Overview

Measurements and calculations derived from ultrasound images are intended to supplement other clinical procedures available to the attending physician. The accuracy of measurement is not only determined by system accuracy, but also by the use of proper medical protocols. When appropriate, be sure to note any protocols associated with a particular measurement or calculation. Formulas and databases used within the system software that are associated with specific investigations are noted. Refer to the original article describing the investigators recommended clinical procedures.

There are five versions which enable calculations of the Gestational Age of the fetus. The five versions are:

- U.S. Version
- Tokyo University Version
- Osaka University Version
- European Version
- Australian Version

The factory default version is the U.S. Version.

In addition five user programmable tables are available for obstetric measurements.

Measurement Version Selection

The U.S., Tokyo University, Osaka University, European and Australian versions can be selected by pressing **CONTROL–S1**. The Installation Setup menu is displayed and the preferred version can be selected. To select a measurement version:

1. Press **CONTROL–S1** *ENTER.* The Installation Setup Menu is displayed.
2. Select OB Version
   - Press 1 for the U.S. Version
   - Press 2 for the Tokyo University Version
   - Press 3 for the Osaka University Version
   - Press 4 for the European Version
   - Press 5 for the Australian Version
3. Press *SET* to register any changes and exit out of the menu or press *CLEAR* to abort entry and exit.

Available Measurements

While scanning, press *MEASUREMENT* to display the OB measurement menu at the bottom of the screen. The measurement selections for each version are:



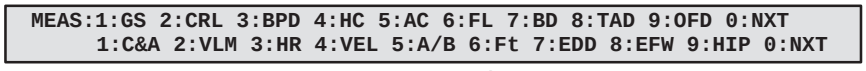
US and Australian Versions



Tokyo University Version



Osaka University Version



European Version

Illustration 32. Version Menu Selections

Available Measurements (cont'd)

Make the desired numerical selection and press *SET*. Pressing 0:NXT toggles between menu lines.

An example of each type of measurement is included in this section.



Hints

If any Distance measurements are done prior to selection of options in the U.S., Tokyo University, Osaka University European and Australian versions, the measured value will be recorded and used for calculation of the Gestational Age.

If the Distance Measurements do not relate to the OB Calculations to be calculated, erase all previous measurements by pressing CLEAR and start again. **An infinite number of measurements can be done**.

A maximum of four OB measurements are displayed at one time in the Calculation Result Area. There are eight callipers used for measurements.

If an OB measurement has not been completed, pressing *CLEAR* once clears the current measurement and the open ended cursor appears on the screen. Pressing *CLEAR* a second time clears the open ended cursor. Pressing *CLEAR* three times clears all measurements on the screen and exits out of the Measurement menu.

If an OB Measurement is complete, pressing *CLEAR* twice clears all data from the display and exits out of the Measurement menu. This does not clear data entered on to the report pages.

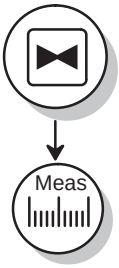


Before invoking European Version Measurements, select the author by pressing **CONTROL–S2.**

For Tokyo University Measurements only, Gestational Age and Estimated Date of Confinement appear in the Calculation Result Area of the display.

Standard Procedures

Prior to making a measurement:

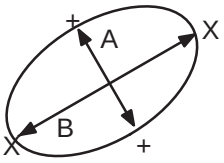


Press *FREEZE* to stop image acquisition.

Press *MEASUREMENT.* A menu and an open ended '⋊' cursor appears on the screen.

OB Measurement Procedures

A/B Ratio



A/B RATIO calculates the ratio of two measured distances or circumferences.

A and B Distance Measurements should be made prior to selecting the A/B Ratio. If two measurements have not been previously done, an Error message will appear as N.M.

5

Select [5] A/B in the General Measurement Menu. The ratio of "A" and "B" will appear on the left side of the screen. If two measurements have not been previously done, an Error message will appear as N.M.

For more details, refer to page 120 in General Measurements.

Abdominal Circumference (AC)



Two measurement procedures (pre–selection and post–selection) help achieve flexibility in making AC measurements.

3

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Perform Measurement

Pre–Selection: The user selects the AC measurement item first and then performs the measurement. The AC measurement can be arrived at by using a Two Distance, Ellipse or Trace Method.

- If AC (and HC) are to always be measured using the Two Distance method, select the Circumference Measurement Method in the Installation Setup as Two Distance. Then AC(and HC) measurement can be done by Two Distance Method only.
- If AC (and HC) are to always be measured by the Ellipse Method, select the Circumference Measurement Method in the Installation Setup as Ellipse. Then AC (and HC) measurement can be done by the Ellipse Method only.
- Similarly to measure AC (and HC) by the Trace Method, select Trace in the Installation Setup.

For details on Installation Setup, refer to the System Setup section on page 33.

Abdominal Circumference (AC) (cont'd)

Perform Measurement

↓

3

Post–Selection: The user performs the measurement first and then assigns the completed measurement to AC and hence obtains the Gestational Age.

- In this procedure the AC measurement can be performed by any method (Two Distance, Ellipse or Trace) and then assigned to AC by selecting the AC item in the Measurement Menu.
- Regardless of the method selected for Circumference Measurement in Installation Setup, the Gestational Age will be calculated and displayed.

To select AC

3

Select [3] in the Main Menu of the U.S. and Australian versions.

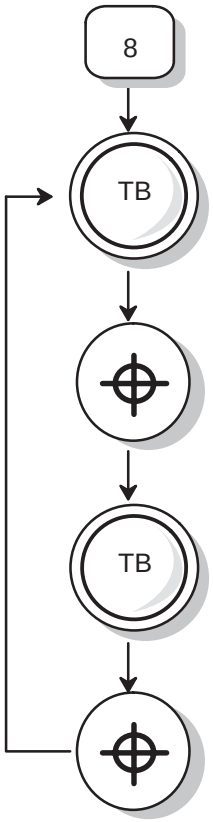
5

Select [5] in the Main Menu of the European version.

For details of Circumference Measurement, refer to the Basic Measurement section on page 105.

Amniotic Fluid Index (AFI)

The Amniotic Fluid Index is determined by taking distance measurements of the amniotic fluid in each of the four quadrants of the uterine cavity. These four measurements are added together to calculate the Amniotic Fluid Index. As many as four Amniotic Fluid Index calculations can be displayed at a time.



Select [8] in the Main Menu of the U.S. version.

Use the *TRACKBALL* to position the open ended '×' cursor at the start point of measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of measurement.

Press *SET* to fix the end point. Another open ended '×' cursor appears to start the next measurement. Follow the same procedure for 4 Distance Measurements in the proper scan planes to arrive at the Amniotic Fluid Index calculation which is displayed in the Calculation Result Area of the display in cm as AFI1, AFI2, AFI3 and AFI4.

Hints

If any distance measurements are available before invoking the Amniotic Fluid Index, only the remaining distance measurement needs to be made to arrive at AFI.

Unfreezing the image after doing one AFI measurement, does not erase the results in the Calculation Result Area, and you can carry on the remaining calculations to arrive at the AFI value by following the same procedure above.

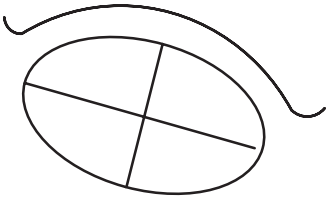
Amniotic Fluid Index (continued)

When all four quadrants have been measured and all four callipers appear on the screen the AFI will be calculated and displayed in the Calculation Result Area of the display.

The normal values are considered to be:

36–40 weeks:
0–5 cm = very low
5.1–8.0cm = low
8.1 – 18.0 cm = normal
>18.0 = high

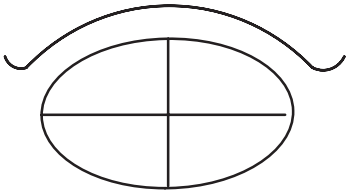
Dr. Rutherford/Dr. Phelan, Obstetrics and Gynecology, Volume 70, No. 3, Part 1, p. 353–6, Sept. 1987.



Sagittal

28–40 weeks:
15.0 cm = average
>20.0 – 24.0 = hydramnios
<5.0–6.0 = Oligohydramnios

Dr. C.C. Smith, *The Female Patient,* Volume 15, p. 85–97, March 1990.

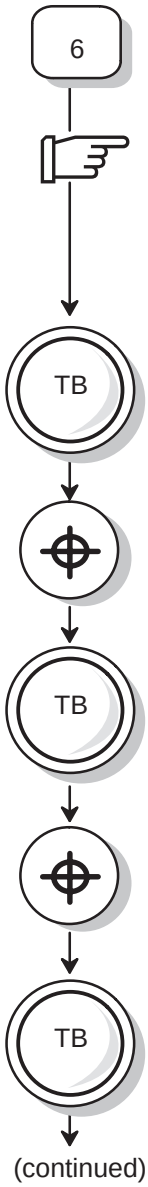


Transverse

Anteroposterior Trunk Diameter & Transverse Trunk Diameter (APTD & TTD)



APTD and TTD are distance measurements which are required for calculation of the Estimated Fetal Body Weight in the Tokyo University Version.



Select [6] in the Main Menu of the Tokyo University version.

If the relevant Distance Measurements are already available, the first distance is applied to APTD and the second distance to TTD. If only one distance measurement is available, it is applied to APTD and the system invokes another measurement for TTD.

Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

Press *SET* to fix the start point of the APTD measurement. A second open ended cursor '×' appears.

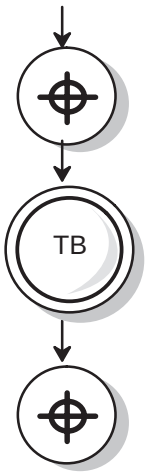
Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. An open ended '×' cursor appears again for the TTD measurement.

Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement for TTD.

(continued)

Anteroposterior Trunk Diameter & Transverse Trunk Diameter (cont'd)



Press *SET* to fix the start point. A second open ended '×' cursor appears.

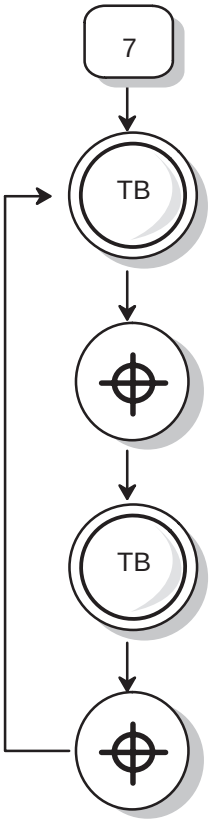
Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. The Distance Measurement for APTD and TTD appear in the Calculation Result Area of the display.

Binocular Distance (BD)



Binocular Distance is the measurement taken between the two sockets of the fetal eyes to estimate the fetal age.



Select [7] in the Main Menu of the European Version.

Use the *TRACKBALL* to position the open ended '×' cursor at the start point of measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of measurement.

Press *SET* to fix the end point. The Gestational Age will then be displayed in the Calculation Result Area of the Display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

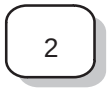
Biparietal Diameter (BPD)



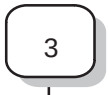
Biparietal Diameter is the measurement taken between two parietal eminence of the fetal head to estimate the fetal age.



Select [1] in the Main Menu of the U.S. and Australian versions.



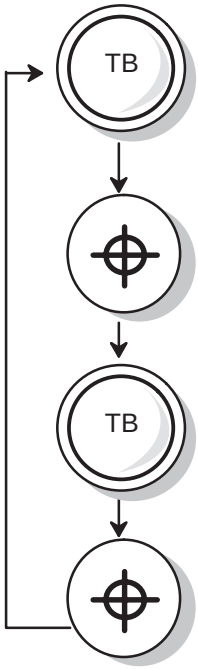
Select [2] in the Main Menu of the Tokyo University and Osaka University version.



Select [3] in the Main Menu of the European version.



If the relevant Distance Measurement is already available, the Gestational Age is calculated and appears in the Calculation Result Area of the display.



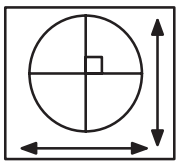
Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the measurement.

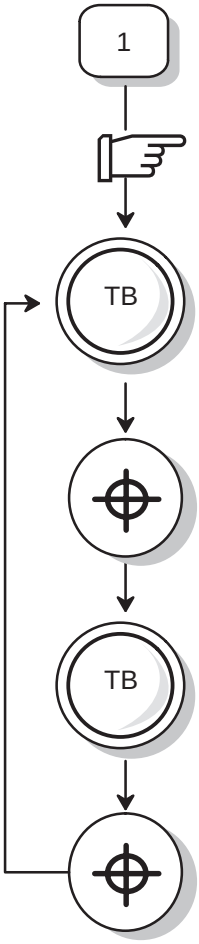
Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Circumference & Area



CIRCUMFERENCE and *AREA* can be computed using two distance, ellipse or trace method.

The two distance method is illustrated below. For details on Circumference and Area measurements refer to the General Measurement section on page 105.



Select [1] in the Sub Menu. If the sub menu was used for a prior calculation, the system defaults back to the sub menu when *MEASUREMENT* is pressed.

NOTE: This process need not be continued if two distance measurements have previously been calculated.

Use the *TRACKBALL* to move the open ended '×' cursor to the start point of the measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET,* the open ended '×' cursor appears again. Follow the same procedure to make the second distance measurement. The measurements appear on the left side of the display.

Crown Rump Length (CRL)



Crown Rump Length measures the distance from the head to the rump (gluteal region) of the fetal body to estimate the fetal age.



Select [1] in Main Menu of the Osaka University version.



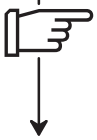
Select [2] in the Main Menu of the European version.



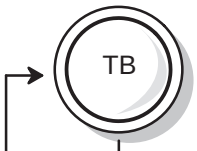
Select [3] in Main Menu of the Tokyo University version.



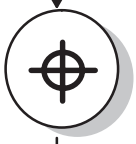
Select [5] in the U.S. and Australian versions.



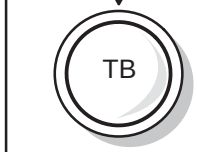
If the relevant Distance Measurement is already available, the Gestational Age is calculated and appears in the Calculation Result Area of the display.



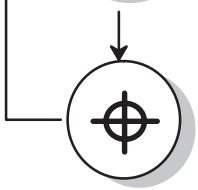
Use the *TRACKBALL* to position the open ended ‘×’ cursor at the start point of the measurement.



Press *SET* to fix the start point. A second open ended ‘×’ cursor appears.



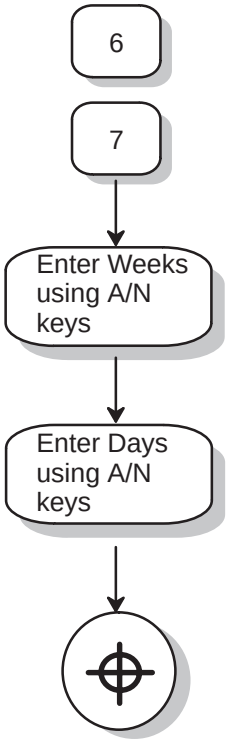
Use the *TRACKBALL* to move the cursor to the end point of the measurement.



Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Estimated Date of Confinement (EDC/EDD)

Use this method to arrive at the Estimated Date of Confinement from Estimated Gestational Age (EGA).



Select [6] in the Main Menu of the U.S. and Australian versions.

Select [7] in the Main Menu of the Tokyo and Osaka University versions and [7] in the Sub Menu of the European version.

GA: __W__D appears. Enter the number of gestation weeks using Alphanumeric keys. Eg. 23W, the cursor advances to the next field.

Enter number of days using alphanumeric keys. Eg., 5D.

Press *SET*.
EDC/EDD appears in the Calculation Result Area of the Display. Eg. EDC/EDD 31/03.

If the week is a single digit number (Eg. 5), use *RETURN* or *CONTROL/ENTER* to proceed to the next field (days). Use *BACK SPACE* to edit characters to the left of the cursor.

- *In US and Australian Report pages, the LMP and EDD from EGA is calculated and displayed using the value entered here.*
- *In Osaka and Tokyo University Report pages, the pregnancy origin can be calculated from the EGA entered here by choosing option 2:DGA as pregnancy origin.*
- *In European Report pages, apart from the choice of using the EGA entered here as the pregnancy origin the EDD and LMP is also calculated and displayed using this value.*

Estimated Fetal Weight (EFW) - U.S. and Australia

The Estimated Fetal Weight is arrived at by five possible methods: using BPD/AC, FL/AC, FL/AC/HC, BPD/AC/FL or FL/AC/HC/BPD. The corresponding EFW is displayed on the left side of the screen as EFW#1, #2, #3, #4 or #5 in that order
For example If BPD and AC were measured then the EFW will display as EFW#1 and if BPD, HC, AC, FL measurements are performed the EFW displayed will be EFW#5. Refer Table 10 below.

7

Select [7] in the Main Menu for Estimated Fetal Weight. The calculations appear on the Calculation Result Area on the display.

Method	Measurements Used
EFW#1	BPD/AC
EFW#2	FL/AC
EFW#3	FL/AC/HC
EFW#4	BPD/AC/FL
EFW#5	BPD/HC/AC/FL

Table 10 EFW Methods

Estimated Fetal Weight (BPD/AC)

The Estimated Fetal Weight #1 is computed using a Shepard/Richards/Berkowitz Model. *"An evaluation of 2 equations for predicting weight by Ultrasound" (Shephard et.al. AM.J. Obstet. Gynecol; 142; 47–54, 1982)*

Estimated Fetal Weight is determined according to the equation:

EFW=10^(–1.7942+0.166*BPD+(0.046*AC)–((2.646*AC* BPD/1000)).

The above formula yields Estimated Fetal Weight in grams. When EFW is selected, this calculation is made only if BPD/AC measurements are the only available measurements.

Estimated Fetal Weight (FL/AC)

The Estimated Fetal Weight #2 is computed using the Hadlock model. (Hadlock, F.P., et al, : *"Sonographic Estimation of Fetal Weight", Radiology, 150: 535–540, 1984)*

EFW is determined according to the equation:

EFW=10^(1.304+(0.05281*AC)+(0.1938*FL)–(0.004*AC* FL)).

The above formula yields EFW in grams when the AC and FL are in centimeters.

When EFW is selected, this calculation is made only if FL/AC are the only available measurements within the set BPD/HC/AC/FL.

Estimated Fetal Weight (FL/AC/HC)

The Estimated Fetal Weight #3 (EFW) is computed using a Hadlock, Harris, Sharman, Deter and Park model. *"Estimation of fetal weight with the use of head, body and femur measurements–A prospective study". (American Journal of Obstetrics and Gynecology 151: 333–337, 1985)*

EFW is determined according to the equation:

EFW=10^(1.326–0.00326*AC*FL)+(0.0107*HC)+0.0438* AC)+(0.158*FL)

The above formula yields EFW in grams, when the FL, AC and HC measurements are in cm.

When EFW is selected, this calculation is made only if FL/AC/HC are the only available measurements.

Estimated Fetal Weight (BPD/AC/FL)

The Estimated Fetal Weight #4 (EFW) is computed using a Hadlock, Harris, Sharman, Deter and Park model. *"Estimation of fetal weight with the use of head, body and femur measurements–A prospective study". (American Journal of Obstetrics and Gynecology 151: 333, 1985)*

EFW is determined according to the equation:

EFW=10^(1.335–(0.0034*AC*FL) + (0.0316*BPD)+(0.457*AC)+(0.1623*FL)).

The above formula yields EFW in grams when the BPD, AC and FL are in centimeters.

When EFW is selected, this calculation is made only if BPD/AC/FL are the only available measurements.

Estimated Fetal Weight (BPD/HC/AC/FL)

The Estimated Fetal Weight #5 (EFW) is computed using a Hadlock, Harris, Sharman, Deter and Park model. *"Estimation of fetal weight with the use of head, body and femur measurements–A prospective study". (American Journal of Obstetrics and Gynecology 151: 333, 1985)*

EFW is determined according to the equation:

EFW=10^(1.3596–(0.00386*AC*FL)+(0.0064*HC) +(0.00061*BPD*AC)+(0.0424*AC)+(0.174*FL)

The above formula yields EFW in grams, when the BPD, HC, AC and FL measurements are in cm.

When EFW is selected, this calculation is made only if BPD/HC/AC/FL are the only available measurements.



All OB Calculations are calculated with average values. For example, if two BPD values are available, the system uses the average of those values. If it is desired to only use a single measurement for calculation, deselect the values in the Measurement Averaging Page that should not be averaged.

Estimated Fetal Body Weight (EFBW) - Tokyo University

The Estimated Fetal Body Weight is computed using the distance measurements of **BPD, APTD** (Anteroposterior Trunk Diameter)**, TTD** (Transverse Trunk Diameter) and **FL.** These measurements have to be completed first to arrive at the computation. Calculations are done based on the last measurement.

8

Select [8] in Main Menu for Estimated Fetal Body Weight. The calculations are displayed for BPD, APTD, TTD and FL in the Calculation Result Area of the display.

Estimated Fetal Body weight is computed using a Todai model (Tokyo University).

The formula yields EFBW in grams where the BPD, APTD (Anteroposterior Trunk Diameter), TTD (Transverse Trunk Diameter) and FL are in cm. Four measurements are required.

$EFBW=1.07*BPD^3+3.42*APTD*TTD*FL$

If any of the above Measurements are not available, the Calculation Result Area will display EFW N.M.

Estimated Fetal Body Weight (EFBW) - Osaka University

The Estimated Fetal Body Weight is computed using two distance calculations **(BPD & FL)** and one area calculation **(FTA)**. These measurements have to be completed first to arrive at the computation. Calculations are made based on the last measurement made.

7

Select [7] in the Main Menu for Estimated Fetal Body Weight. The calculation appears for BPD, FL and FTA in the Calculation Result Area.

$EFBW=1.25647*BPD^3+3.50655*FTA*FL+6.3$

If no Measurements are available, the Calculation Result Area will display EFBW N.M

Estimated Fetal Weight (EFW) - European

The Estimated Fetal Weight is arrived at by four possible methods: BPD/AC (Shepard/Warsoff), BPD/AC (Shepard:Richards/Berkowitz), FL/AC/HC (Hadlock, Radiology 150:535:1984) and BPD/TAD (German). The selected EFW is displayed on the left side of the screen. (The selection can be made in the European OB Table Setup by pressing *CONTROL S2*). Calculations are made based on the last measurement done.



Select [8] in the Main Menu for Estimated Fetal Weight. The calculations appear on the Calculation Result Area on the display.



If any of the above Measurements are not available, the Calculation Result Area will display EFW N.M.

Estimated Fetal Weight (BPD/AC) (Shepard/Warsoff Model)

Estimated Fetal Weight is determined according to the equation:

EFW[g]=10^(1.7288+0.09184*BPD[cm]+(0.02581*AC[cm])
+(0.00011*BPD[cm] *AC[cm]).

The above formula yields Estimated Fetal Weight in grams.

When EFW is selected, this calculation is made only if BPD/AC measurements are already available. If not available, the EFW to the left of the screen will display EFW N.M.

Estimated Fetal Weight (BPD/AC) (Shepard:Richards/Berkowitz)

Estimated Fetal Weight (Shepard:Richards/Berkowitz Model) is determined according to the equation:

EFW[g]=10^(3–1.7492+(0.046*AC[cm])+(0.166* BPD[cm])–(0.002646*AC[cm] *BPD[cm]).

The above formula yields Estimated Fetal Weight in grams.

When EFW is selected, this calculation is made only if BPD/AC measurements are already available. If not available, the EFW to the left of the screen will display EFW N.M.

Estimated Fetal Weight (FL/AC/HC) (Hadlock, Radiology 150:535,1984)

The Estimated Fetal Weight (EFW) is computed using a Hadlock, Radiology 150:535,1984 model.

EFW is determined according to the equation:

EFW[g]=10^(1.5662–(0.0108*HC[cm])+(0.0468*AC[cm] +0.171*FL[cm])+(0.00034*HC[cm])^2)–(0.003685* AC[cm]*FL[cm]).

The above formula yields EFW in grams, when the FL, AC and HC measurements are in cm.

When EFW is selected, this calculation is made only if FL/AC/HC measurements are already available. If not available, the EFW to the left of the screen will display O.F or U.F and will appear blank in the report page.

If any of the above Measurements are not available, the Calculation Result Area will display EFW N.M.

Estimated Fetal Weight (BPD/TAD) (German)

Estimated Fetal Weight is determined according to the equation:

EFW[kg]= 0.515263–(0.105775*BPD[mm])+ 0.000930707*(BPD[mm]^2)+(0.0649145*TAD[mm])–(0.0 0020562*(TAD[mm])^2).

The above formula yields Estimated Fetal Weight in kg.

When EFW is selected, this calculation is made only if BPD/TAD measurements are already available. If not available, the EFW to the left of the screen will display O.F or U.F and will appear blank in the report page.

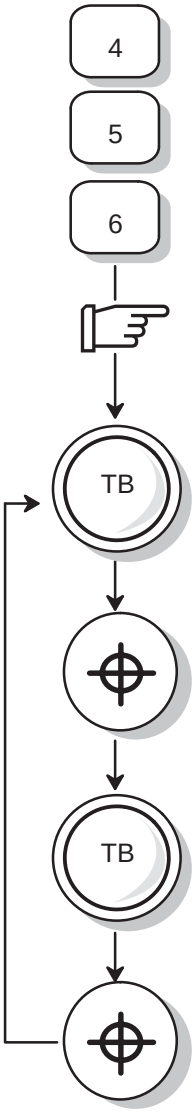


All OB Calculations are calculated with average values. For example, if two BPD values are available, the system uses the average of those values. If it is desired to only use a single measurement for calculation, deselect the values in the Measurement Averaging Page that should not be averaged.

Femur Length (FL)



Femur Length is the measurement taken of the thigh bone from the greater trochanter to the condyle of the fetal body to estimate the fetal age.



Select [4] in the Main Menu of the U.S, Tokyo University and Australian Versions.

Select [5] in the Main Menu of the Osaka University Version.

Select [6] in the Main Menu of the European Version.

If the relevant Distance Measurement is already available, the Gestational Age is calculated and appears in the Calculation Result Area of the display.

Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Fetal Trunk Cross Sectional Area (FTA)



Fetal Age Estimation is arrived at by measuring the cross–sectional area of the fetal trunk. Two measurement procedures (pre–selection and post–selection) help achieve flexibility in making FTA measurements.

3

↓

Take Measurement

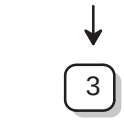
Pre–Selection: The user selects the FTA measurement item first and then performs the measurement. The FTA measurement can be arrived at by using Two Distance, Ellipse or Trace Method.

- If FTA (AC and HC) are to always be measured using the Two Distance method, select the Circumference Measurement Method in the Installation Setup as Two Distance. Then FTA selection will only use the Two Distance Method.
- If FTA (AC and HC) are to always be measured by the Ellipse Method, select the Circumference Measurement Method in the Installation Setup as Ellipse. Then FTA selection (AC and HC) will only use Ellipse Method.
- Similarly to measure FTA (AC and HC) by the Trace Method, select Trace in the Installation Setup.

For details on Installation Setup, refer to the System Setup section on page 33.

Fetal Trunk Cross Sectional Area (FTA) (cont'd)

Perform Measurement



Post–Selection: The user performs the measurement first and then assigns the completed measurement to FTA and hence obtains the Gestational Age.

- In this procedure FTA measurement can be performed by any method (Two Distance, Ellipse or Trace) and then assigned to FTA by selecting the FTA item in the Measurement Menu.
- Regardless of the method selected for Circumference Measurement in Installation Setup, the Gestational Age will be calculated and displayed.

To select FTA:



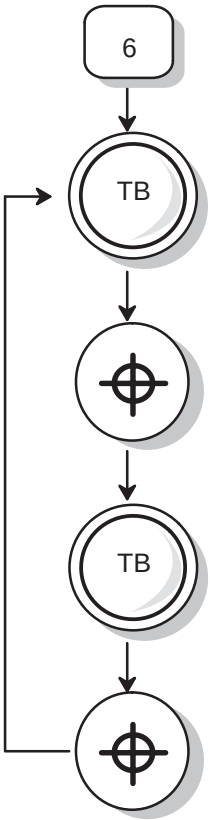
Select [3] in the Main Menu of the Osaka University Version.

For details of Area Measurement, refer to the Basic Measurement section on page 105.

Foot Distance (Ft)



Foot Distance is the measurement taken from the heel to the toe of the fetus to estimate the fetal age.



Select [6] in the Sub Menu of the European Version.

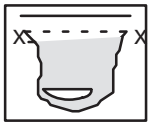
Use the *TRACKBALL* to position the open ended '×' cursor at the start point of measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

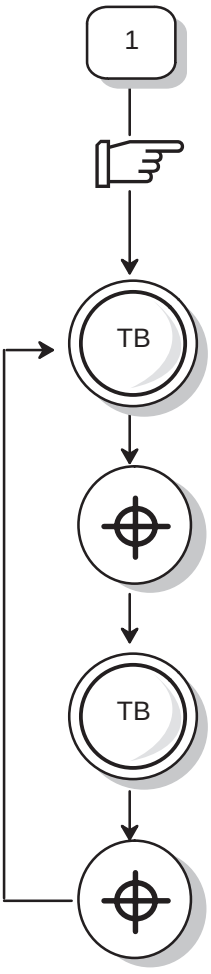
Use the *TRACKBALL* to move the cursor to the end point of measurement.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Gestational Sac (GS)



Gestational Sac is the measurement taken of the Sac of the fetus.



Select [1] in the Main Menu of the Tokyo University and European versions.

If the relevant Distance Measurement is already available, the Gestational Age is calculated and appears in the Calculation Result Area of the display.

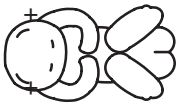
Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the Gestational Sac.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the Gestational Sac.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Head Circumference (HC)



Two measurement procedures (pre–selection and post–selection) help achieve flexibility in making HC measurements.

2

Take Measurement

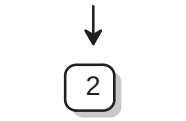
Pre–Selection: The user selects the HC measurement item first and then performs the measurement. The HC measurement can be arrived at by using a Two Distance, Ellipse or Trace Method.

- If HC (AC and FTA) are to always be measured using the Two Distance method select Circumference Measurement Method in the Installation Setup as Two Distance. Then selecting HC, will measure HC only by the Two Distance Method.
- If HC (AC and FTA) are to always be measured by the Ellipse Method, select Circumference Measurement Method in the Installation Setup as Ellipse. Then selecting HC (AC and FTA) will measure HC only by the Ellipse Method.
- Similarly to measure HC (AC and FTA) by the Trace Method select Trace in the Installation Setup.

For details on Installation Setup, refer to the System Setup section on page 33.

Head Circumference (cont.)

perform Measurement



2

Post–Selection: The user performs the measurement first and then assigns the completed measurement to HC and hence obtains the Gestational Age.

- In this procedure the HC measurement can be performed by any method (Two Distance, Ellipse or Trace) and then assigned to HC by selecting the HC item in the Measurement Menu.
- Regardless of the method selected for Circumference Measurement in the Installation Setup, the Gestational Age will be calculated and displayed.

To select HC:

2

Select [2] in the Main Menu of the US and Australian Versions.

4

Select [4] in the Main Menu of the European Version.

For details of Area Measurement, refer to the Basic Measurement section on page 105.

HIP Dysplasia (HIP)

The HIP calculation assists in assessing the development of the infant hip. In this calculation three straight lines are superimposed on the image and aligned with the anatomical features. The two angles are computed, displayed and can be used by the physician in making a diagnosis.

The three lines are (Source: R GRAF, journal of Pediatric Orthopedics, 4: 735–740 (1984)).

- The inclination line connects the osseous convexity to the labrum acetabulare.
- The Acetabulum roof line connects the lower edge of the osileum to the osseous convexity.
- The Baseline connects the osseous acetabulum convexity to the point where the joint capsule and the perichondrium unite with the iliac bone.

The Angle $\propto$ (Alpha) is the supplement of the angle between 1 and 3. It characterizes the osseous convexity. The angle β (Beta) is the angle between lines 1 and 2. It characterizes the bone supplementing additional roofing by the cartilaginous convexity.

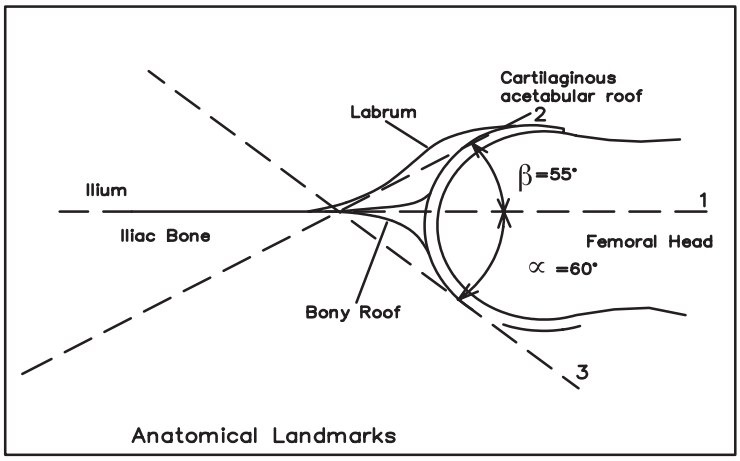
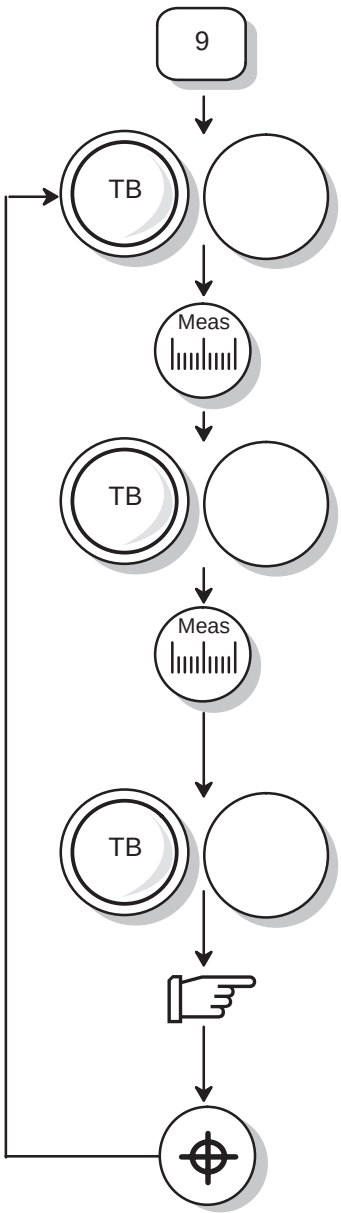


Illustration 33. HIP Dysplasia

Hip Measurement with Cranial Left Orientation



Select [9] in the Main Menu in U.S and Australian Version and in the Sub Menu in European Version. Horizontal Display line #1 appears on the screen.

Use the *TRACKBALL* and *GAIN/ROTATE* knob to position the line #1 as the baseline. It can be rotated up to 45° either in the clockwise or counter clockwise direction from the horizontal line.

Press *MEASUREMENT* or *SET*, display line #2 appears on the screen. The Greek letter beta (β) appears halfway between lines 1 & 2 and the angle is 55° by default which is counter clockwise to line #1.

Use the *TRACKBALL* and *GAIN/ROTATE* knob to position the line #2. With this rotation β varies between 0°and 90° in the counter clockwise direction with reference to line #1.

Press *MEASUREMENT* or *SET*, display line #3 appears on the screen. The Greek letter alpha ($\propto$) appears halfway between lines 1 and 3 and the angle is 60° by default which is clockwise from line #1. In the Calculation Result Area, the results of angles $\propto$ and β appear.

Use the *TRACKBALL* and *GAIN/ROTATE* knob to position line #3. With this rotation $\propto$ varies between 0°and 90° in the clockwise direction with reference to line #1.

If any of the three line placements are not satisfactory, each line can be reactivated by pressing *MEASUREMENT.*

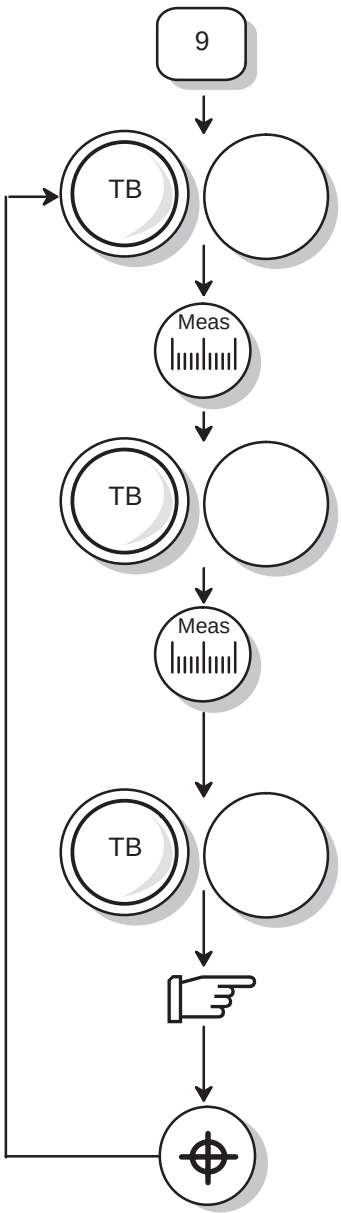
Press *SET* to fix line #3.

Should further measurements need to be taken, press *SET* again to invoke Display line #1 and follow the procedure as indicated above. Upto four results of angles $\propto$ and β can be displayed at the same time.

Hints

The Left/Right *ROTATE* keys can also be used to rotate the display lines.

Hip Measurement with Caudal Left Orientation



Select [9] in the Main Menu in U.S and Australian Version and in the Sub Menu in European Version. Horizontal Display line #1 appears on the screen.

Use the *TRACKBALL* and *GAIN/ROTATE* knob to position the line #1 as the baseline. It can be rotated up to 45° either in the clockwise or counter clockwise direction from the horizontal line.

Press *MEASUREMENT* or *SET*, display line #2 appears on the screen. The Greek letter beta (β) appears halfway between lines 1 & 2 and the angle is 55° by default which is clockwise to line #1.

Use the *TRACKBALL* and *GAIN/ROTATE* knob to position the line #2. With this rotation β varies between 0°and 90° in the clockwise direction with reference to line #1.

Press *MEASUREMENT* or *SET*, display line #3 appears on the screen. The Greek letter alpha ($\propto$) appears halfway between lines 1 and 3 and the angle is 60° by default which is counter clockwise from line #1. In the Calculation Result Area, the results of angles $\propto$ and β appear.

Use the *TRACKBALL* and *GAIN/ROTATE* knob to position line #3. With this rotation $\propto$ varies between 0°and 90° in the counter clockwise direction with reference to line #1.

If any of the three line placements are not satisfactory, each line can be reactivated by pressing *MEASUREMENT.*

Press *SET* to fix line #3.

Should further measurements need to be taken, press *SET* again to invoke Display line #1 and follow the procedure as indicated above. Upto four results of angles $\propto$and β can be displayed at the same time.

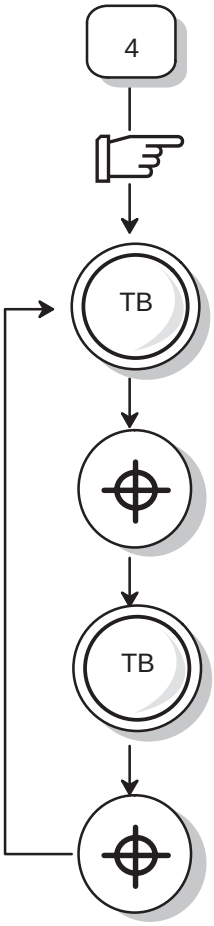
Hints

The Left/Right *ROTATE* keys can also be used to rotate the display lines.

Humerus Bone Length (HL)



The measurement of the Humerus Bone Length (the shoulder bone) is taken from the greater tubercule to the trochea to estimate the fetal age.



Select [4] in the Main Menu of the Osaka University Version.

If the relevant Distance Measurement is already available, the Gestational Age is will be calculated and appears in the Calculation Result Area of the display.

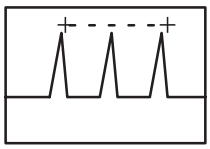
Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

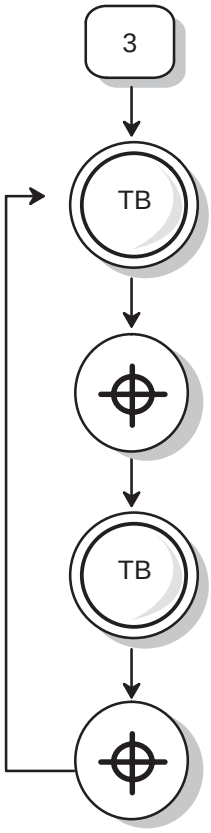
Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Heart Rate (Beats per minute)



HEART RATE in beats per minute is calculated by measuring the interval between 2 heartbeats in the *M-Mode or B/M-Mode.* If calculations are done in the wrong mode an error message HR ILG will appear in the Calculation Result Area. Four Heart Rate calculations can be displayed in the Calculation Result Area of the Display HR = 60 x 2/Lapsed time.



Select [3] in the Sub Menu. If the sub menu was used for prior calculation, the system defaults back to the sub menu when *MEASUREMENT* is pressed.

Use the *TRACKBALL* to move the M-Mode measurement cursor to the start point of measurement.

Press *SET* to fix the start point. A second M–Mode measurement cursor appears.

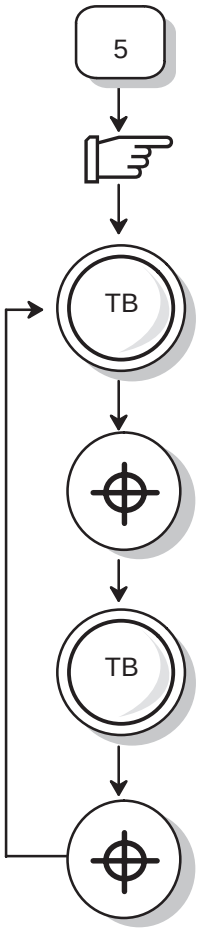
Use the *TRACKBALL* to move the cursor to the end point of measurement.

Press *SET* to fix the end point. The heart rate is displayed on the left side of the screen in beats per minute. Press *SET* a second time to repeat procedure for more measurements.

Length of Vertebra (LV)



Length of Vertebra is the length of the Vertebra measurement from the Cervical to the Coccyx of the fetal body to estimate the fetal age.



Select [5] in the Main Menu of the Tokyo University Version.

If the relevant Distance Measurement is already available, the Gestational Age is calculated and appears in the Calculation Result Area of the display.

Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

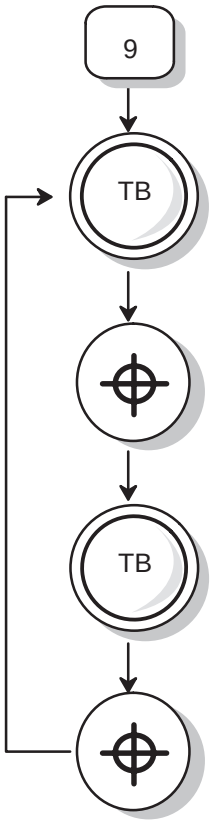
Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Occipito Frontal Diameter (OFD)

OFD is the longest measurement taken from the head circumference or measured from the front to the back of the head of the fetus.



Select [9] in the Main Menu of the European Version.

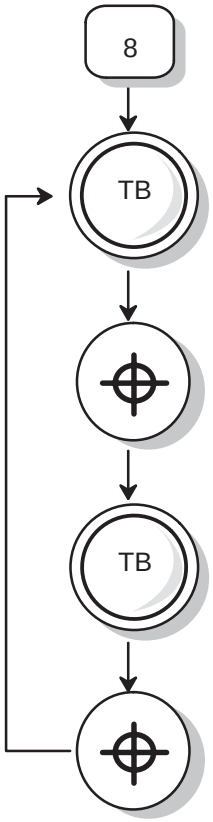
Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Transverse Abdominal Diameter (TAD)



Select [8] in the Main Menu of the European Version.

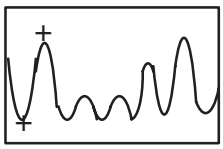
Use the *TRACKBALL* to position the open ended '×' cursor at the start point of the measurement.

Press *SET* to fix the start point. A second open ended '×' cursor appears.

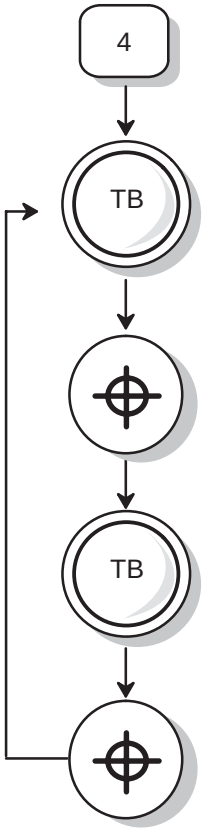
Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. The Gestational Age appears in the Calculation Result Area of the display. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Velocity (mm/second)



VELOCITY is the difference in tissue depth (range of tissue motion) divided by the elapsed time captured in the M-Mode image or B/M-Mode. If calculations are done in the wrong mode, an error message VEL ILG will appear in the Calculation Result Area. Velocity calculations are measured as moving mm/second. Velocity= Height of a Wave/Elapsed Time.



Select [4] in the Sub Menu. If the sub menu was used for a prior calculation, the system defaults back to the sub menu when *MEASUREMENT* is pressed.

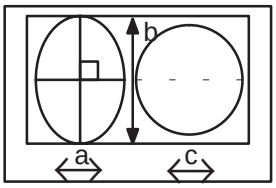
Use the *TRACKBALL* to move the M-Mode measurement cursor to the start point of the measurement.

Press *SET* to fix the start point. A second M-Mode measurement cursor appears.

Use the *TRACKBALL* to move the cursor to the end point of the measurement.

Press *SET* to fix the end point. Should further measurements need to be taken, press *SET* again to invoke the second cursor and follow the procedure as indicated above. Four calculations can be taken at the same time.

Volume (cm^3)



VOLUME is calculated using one, two or three Distance measurements or one Ellipse and 1 Distance or two Ellipse measurements.

Using B-Mode or dual B-Mode, scan the object in 2 scan planes, sagittal and transverse, and measure the depth.

If the calculations are done in the wrong mode an error message will appear on the left side of the screen as ILG.

Refer to the *General Measurements* Chapter (page 110) for details of volume measurement and formula.

Calculation Error Messages

The calculation error messages and their explanation are given in table below.

MESSAGE	EXPANSION	EXPLANATION
ILG	Illegal	Wrong Mode selected (Eg. “VEL” in B–Mode)
N.M	No Measure	Calculations were attempted before all measurement steps were made.
ERR	Error	The denominator was “0”
O.O.R	Out of Range	The calculation is out of range. The measured value is too large or too small.

Table 11. Error Messages

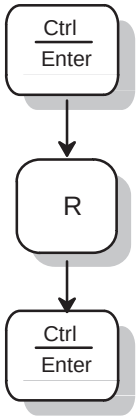
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OB Report Page

Overview

Accurate and complete report presentation starts at the beginning of the patient exam. This section explains how to display, edit, exit and print a hard copy of the Obstetrical Report Pages. The five versions (U.S., Tokyo University, Osaka University, European and Australian) are explained.

Displaying and Exiting the Report Page



Press *CONTROL*

Press *R* for Gestational Report

Press *ENTER.* The Report Page corresponding to the active OB version is displayed.

Press *CONTROL or CLEAR* to exit the Report Page display and return to the normal ultrasound image display.

Ensure that the diagnostic category is OB (for details of Diagnostic Category refer to page 125).

Hints

The Report Page can also be selected by directly pressing the alphanumeric key ‘R’. The user should not be in Comment mode when this function is accessed.

Edit Fields

The Report Page for the U.S., Tokyo University, Osaka University, European and Australian versions contain edit fields.

Use alphanumeric keys to enter details. The *TRACKBALL* or *SHIFT* ←↑↓→ keys can be used to move from one field to the next.

Characters cannot be inserted into text that has already been entered by the system.

If illegal data is entered, a beep is heard and the cursor will not move to the next field.

Use the *TRACKBALL* or *SHIFT* ←↑↓→ keys to move the highlight cursor. The cursor automatically advances to the next field once a particular field edit is complete or use the *TRACKBALL* or *SHIFT* ←↑↓→ keys to move to the next field.

Hardcopy Output of the Report Page

The LOGIQ™ α100 videographic printer generates hardcopy prints. To print the report, press *RECORD* when the report page is on display.

When *RECORD* is pressed, the system modifies the displayed report page before starting the recording process. First, it erases the gestational age error marker (the arrow which may appear to the right of a gestational age). The bars provide white space on the hardcopy print for the operator's signature and date. After the exposure, the report page draws solid white areas at the bottom of the report page. The system also erases the bars and rewrites the GA error marker.

Report Page Format

U.S. Version Report Page

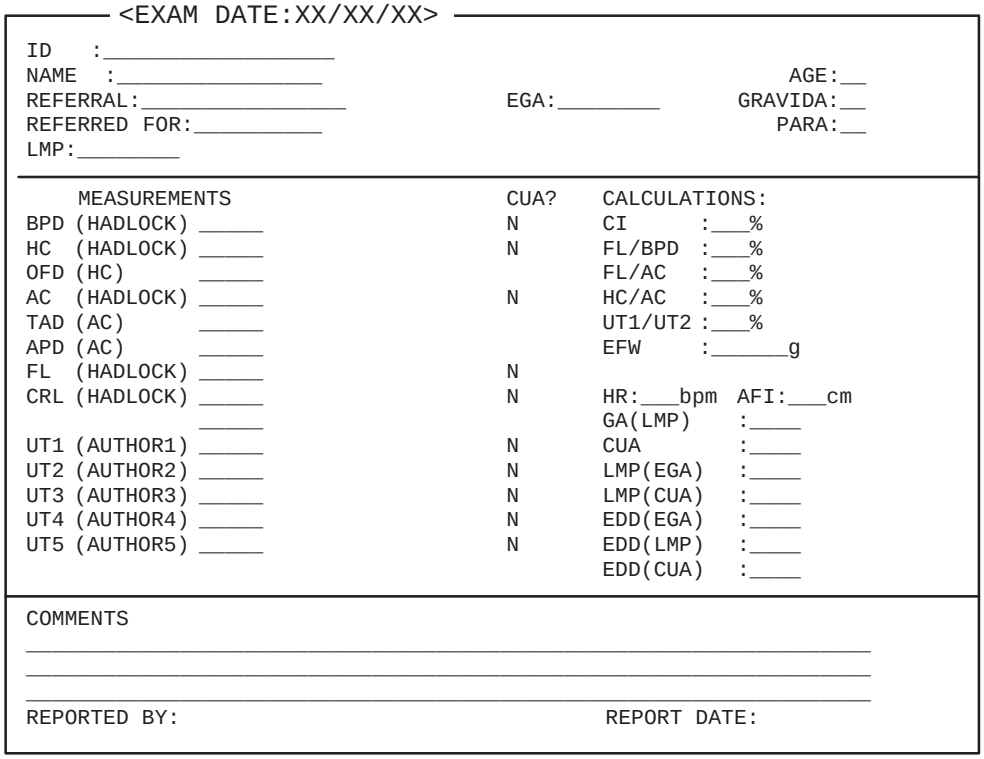

<EXAM DATE:XX/XX/XX>
ID :_____
NAME :_____ AGE:__
REFERRAL:_____ EGA:_____ GRAVIDA:__
REFERRED FOR:_____ PARA:__
LMP:_____
MEASUREMENTS CUA? CALCULATIONS:
BPD (HADLOCK) _____ N CI :___%
HC (HADLOCK) _____ N FL/BPD :___%
OFD (HC) _____ FL/AC :___%
AC (HADLOCK) _____ N HC/AC :___%
TAD (AC) _____ UT1/UT2 :___%
APD (AC) _____ EFW :_____g
FL (HADLOCK) _____ N
CRL (HADLOCK) _____ N HR:___bpm AFI:___cm
_____ GA(LMP) :____
UT1 (AUTHOR1) _____ N CUA :____
UT2 (AUTHOR2) _____ N LMP(EGA) :____
UT3 (AUTHOR3) _____ N LMP(CUA) :____
UT4 (AUTHOR4) _____ N EDD(EGA) :____
UT5 (AUTHOR5) _____ N EDD(LMP) :____
EDD(CUA) :____
COMMENTS
REPORTED BY: REPORT DATE:

Illustration 34. U.S. Version Report Page

The OB user table fields will be shown only if the corresponding User Tables are filled up. UT_n and $Author_n$ are the names given to the OB User Tables by the user.

U.S. Version Report Page (cont'd)

Exam Date: The exam date on the report page is the same date as preset on the LOGIQ™ α100 system clock. To change the date, press *CONTROL S1* for the Installation Setup menu. The date format can also be changed.

ID: *Patient ID.* The same 16 characters appearing on the upper right corner of the B-Mode display automatically appear on the report page.

Name: *Patient Name.* The same 28 characters appearing on the upper right corner of the B-Mode display automatically appear on the report page.

Referral: Enter the name of the referring physician (up to 16 characters). The cursor automatically goes to the next field once 16 characters have been entered, otherwise use the *TRACKBALL* or the *SHIFT*↑↓ *ARROW* keys to go to the next field.

Referred For: Enter the reason for referral (up to 30 characters).

LMP**:** *Last Menstrual Period.* Enter the date from the first day of the patient's last menstrual period prior to pregnancy. Enter the date as: (MM/DD/YY) Month (2 digits)/ Day (2 digits)/ Year (2 digits).



If the four digit format is used to enter 'YEAR', the system ignores the first two digits of the year.

EGA: *Estimated Gestational Age.* Enter the Estimated Gestational Age at the time of the examination. Enter the weeks (2 digits), followed by the letter "W", the days (one digit), followed by the letter "D", Eg. 14W2D. This data is used to calculate the estimated delivery date by EGA.

Age: *Patient Age.* Enter patient age using any two-digit integer. If zero is entered, the field display is blank.

Gravida: Enter the number of pregnancies of the patient using any two-digit integer. If zero is entered, the field display will be blank.

Para: Enter the number of deliveries of the patient using any two-digit integer. If zero is entered, the field display will be blank.

U.S. Version Report Page (cont'd)

BPD: The Biparietal Diameter in mm last measured or averaged. The EGA as per Hadlock table is given in weeks and days.

HC: The Head Circumference in mm last measured or averaged. The EGA as per Hadlock table is given in weeks and days.

OFD: The Occipito Frontal Diameter calculated from HC.

AC: The Abdominal Circumference last measured or averaged in mm. The EGA as per Hadlock table is given in weeks and days.

TAD and APD: The Transverse Abdominal Diameter and Abdominal Anterior–Posterior Diameter. Both the TAD and APD are obtained only when the abdominal circumference is measured by the two-diameter method. TAD is the first distance measured and APD is the second.

FL: The Femur Length last measured or averaged. The EGA as per Hadlock table is given in weeks and days.

CRL: The Crown Rump Length last measured or averaged. The EGA as per Hadlock table is given in weeks and days.

UTn: Refer to the OB User Section Table on page 209 for details of this field.

CI: *Cephalic Index*The ratio of BPD to OFD (Occipito Frontal Diameter).

$$\text{Cephalic Index (\%)} = 100 \times \text{BPD} / \text{OFD}$$

Cephalic index's normal value is $79 \pm 8\%$.



The HC should have been measured for calculation of Cephalic Index. The OFD is taken as the long axis of HC. If HC has been measured by trace method, then, the Cephalic Index will not be calculated.

U.S. Version Report Page (cont'd)

FL/BPD: The ratio of femur length to biparietal diameter, in percent. The displayed values are used for calculation. If either is missing, the field is blank. FL/BPD normal ratio is 79± 8% (23 weeks to term).

FL/AC: The ratio of femur length to abdominal circumference, in percent. The displayed FL and AC values are used for the calculation. If either is missing, the field is blank. FL/AC normal ratio is 22± 2% (21 weeks to term).

HC/AC: The ratio of head circumference to abdominal circumference, in percent. The displayed HC/AC values are used for the calculation. If either is missing, the field is blank. HC/AC normal ratio varies throughout the pregnancy.

UT1/UT2: Calculates the ratio between User Table #1 and User Table #2. When both user tables are entered and both measurements are performed, the ratio is calculated and displayed automatically.
For details of OB User Table refer to page 209.

EFW: Estimated Fetal Weight in grams. For details of the model chosen, refer to page 148.

HR: Fetal Heart Rate calculated in beats per minute. If this measurement is not made, the field will appear blank.

AFI: Amniotic Fluid Index in cm. For details of AFI, refer to page 139.

GA (LMP): *Gestational Age by Last Menstrual Period.* This field is dependent on the Last Menstrual Period date entered above. It is computed from the date of the first day of the Last Menstrual Period, according to the formula:

GA (LMP) = {Exam date} – {Last menstrual period}

U.S. Version Report Page (cont'd)

CUA? and AUA?

Two methods are available for calculating the final Ultrasound age.

- CUA
- AUA

The choice is made in the Installation Setup menu. To enter the Setup Menu, refer to page 250.

CUA: CUA is calculated depending on the combination of measurements available as shown below in Table 12. The units of BPD, AC, FL and HC are mm and CUA is weeks.

No.	Available Measurements	Formula CUA=
1	BPD,AC,FL,HC	10.85+.06(HC)(FL)+.67(BPD)+.168(AC)
2	BPD,AC,HC	10.58+.005(HC)^2+.3635(AC)+.02894(BPD)(AC)
3	BPD,FL,HC	11.38+.07(HC)(FL)+.98(BPD)
4	BPD,FL,AC	10.61+.175(BPD)(FL)+.297(AC)+.71(FL)
5	HC,FL,AC	10.33+.031(HC)(FL)+.361(HC)+.0298(AC)(FL)
6	BPD,HC	10.32+.009(HC)^2+1.32(BPD)+.00012(HC)^3
7	BPD,AC	9.57+.524(AC)+.122(BPD)^2
8	BPD,FL	10.5+.197(BPD)(FL)+.95(FL)+.73(BPD)
9	HC,AC	10.31+.012(HC)^2+.385(HC)
10	HC,FL	11.19+.07(HC)(FL)+.263(HC)
11	AC,FL	10.47+.422(AC)+.314(FL)^2–.0121(FL)^3
12	BPD	6.8594+2.6345(BPD)+.008771(BPD)^3
13	HC	8.8+.55(HC)+.00028(HC)^3
14	AC	7.61+.7645(AC)+.00393(HC)^3
15	FL	10.4+2.256(FL)+.195(FL)^2

Table 12. Formulas for CUA calculation.

U.S. Version Report Page (cont'd)



Hints

- BPD, HC, AC and FL measurements, if completed, are by default used in CUA calculation.
- Measurements other than BPD, HC, AC and FL are not used in CUA calculation. If they are forced to be used (by selecting "Y" in their field) then CUA is calculated using the formula:

$$CUA = \frac{G_1 + G_2 + G_3 + ... + G_n}{n}$$

where G_1, G_2, ... G_n are the Gestational Ages obtained from the corresponding measurements selected for use in CUA calculations and n is the total number of such measurements used.

AUA: AUA is the mean of the gestational ages obtained from various measurements. By default, all completed measurements are used in AUA calculation. To execute a measurement in AUA calculation, choose "N" in the appropriate field.

LMP (EGA): The Last Menstrual Period calculated from Estimated Ultrasound age. It is calculated from the formula:

LMP (EGA) = {Exam date} – {Estimated Gestational Age}

LMP (CUA or AUA): The Last Menstrual Period calculated from CUA or AUA as selected in the Setup Menu. It is calculated from the formula:

LMP (CUA or AUA) = {Exam date} – {CUA or AUA as selected in setup}

EDD (EGA): It is the estimated delivery date computed from the estimated gestational age at the time of the exam. This is dependent on the value entered above and is calculated using the formula:

EDD (EGA) = {Exam date} – {EGA} + {40 weeks or 41 weeks as selected in setup}

U.S. Version Report Page (cont'd)

EDD (LMP): Estimated delivery date computed from the date of the first day of the Last Menstrual Period derived from the edit field. The formula is:

EDD (LMP) = {LMP} + {40 weeks or 41 weeks as selected in setup}

EDD (CUA or AUA): Estimated Date of Delivery calculated from CUA or AUA as selected in the Setup Menu. It is calculated using:

EDD (CUA or AUA) = {Exam date} – {CUA or AUA as selected in setup} + {40 weeks or 41 weeks as selected in setup}



All OB Calculations are calculated with average values. For example, if two BPD values are available, the system uses the average of those values. If it is desired to only use a single measurement for calculation, deselect the values in the Measurement Averaging Page that should not be averaged.

Comments: Three lines of comments can be entered, each line consisting of 54 alphanumeric characters.

Gestational Age Error Markers: Whenever three or more gestational age (GA) measurements are included in the CGA (the arithmetic mean of the included gestational ages), an arrow may appear on the report page to mark the GA which is farthest from the CGA. This arrow is immediately to the right of the gestational age. This makes it easy to spot the outlying measurement. If there is a tie between two or more GAs for the outlying measurement, no arrow will appear. When a hardcopy print of the screen is made using *RECORD*, the error marker is temporarily erased and does not appear on the print.

The US version formulas are given in a tabular form in Table 13.

U.S. Version Report Page (cont'd)

Calc Mnemonic	Calc. Name	Input Measurements	Formula	Author Reference
HR	Heart Rate (Beats/minute)	one 2 beat time (Measure manually or automatically)	HR[BPM]=120 [sec]/2beat time[sec]	n/a
GS	Gestational Sac	three distances	GS=(d1+d2+d3)/ 3+3.6225	Hellman, A/OG, 103:789/1969
CRL	Crown Rump Length	one distance	CRL=1.684969+ 0.315646xd1+ 0.049306xd1^2 +0.004057xd1^3 +0.000120456 xd1^4	
FL	Femur Length	one distance	FL=10.38+0.225 6x d1+ 0.001948xd1^2	Hadlock, AJR, 138:875, 1982
BPD	Biparietal Diameter	one distance	BPD=6.8954+ 2.6345xd1+0.008 771xd1^3	Hadlock, JUM 1:97, 1982
AC	Abdominal Circumference	Circumference by trace, ellipse, circle or two distances	AC=7.607+0.764 5 x C+0.00393 x C^2	Hadlock, AJR 139:367, 1982
HC	Head Circumference	Circumference by trace, ellipse, circle or two distances	HC=8.8+0.55xC + 0.00028xC^3	Hadlock, AJR, 138:649, 1982

Table 13.. U.S. Version Formulas

U.S. Version Report Page (cont'd)

EFW #1	Estimated Fetal Weight #1	Average of BPD and Average of AC	EFW=10^(–1.7492+0.166*BPD+ (0.046*AC)–((2.646*AC*BPD)/1000))	Shepard, AJOG, 142:47, 1982
EFW #2	Estimated Fetal Weight #2	Average of FL and Average of AC	EFW=10^(1.304 + (0.05281*AC) + (0.1938*FL)–(0.004*AC*FL))	Hadlock–Radiology 150:535, 1984
EFW #3	Estimated Fetal Weight #3	Average of BPD, Average of AC and Average of FL	EFW=10^(1.335–0.0034*AC*FL)+(0.0316*BPD) + 0.0457*AC) + (0.1623*FL)	Hadlock, AJOG, 151:333, 1985
EFW #4	Estimated Fetal Weight #4	Average of BPD, Average of AC and Average of FL	EFW=10^(1.335–(0.0034*AC*FL) + (0.0316*BPD)+(0.457*AC)+(0.1623*FL)).	Hadlock, AJOG, 151:333, 1985
EFW #5	Estimated Fetal Weight #5	Average of BPD, Average of HC, Average of AC and Average of FL	EFW=10^(1.3596–(0.00386*AC*FL)+(0.0064*HC) +(0.00061*BPD*AC)+(0.0424*AC) +(0.174*FL)	Hadlock, AJOG, 151:333, 1985

Table 13. U.S. Version Formulas (cont'd)

Tokyo University Report Page

```
(TOKYO UNIV.) ── <EXAM DATE:XX/XX/XX> ──────────────────
ID:________
NAME:_____________________________                    AGE:__
REFERRAL:_________________                          GRAVIDA:___
REFERRED FOR:_____________________________             PARA:__
PREGNANCY ORIGIN:1 (1:LMP 2:DGA 3:EDC 4:BBT)     LMP:______

   MEASUREMENTS                    CGA?   CALCULATIONS:
GS  (TOKYO)  ____                  N      EFBW    :___g
BPD (TOKYO)  ____                  N
CRL (TOKYO)  ____                  N
FL  (TOKYO)  ____                  N      HR      :____bpm
LV  (TOKYO)  ____                  N
APTD(TOKYO)  ____                  N
TTD (TOKYO)  ____                  N
                                          UT1/UT2 :____%
UT1 (AUTHOR1)_____                 N
UT2 (AUTHOR2)_____                 N      GA(LMP) :____
UT3 (AUTHOR3)_____                 N      CGA     :____
UT4 (AUTHOR4)_____                 N      EDC(LMP):____
UT5 (AUTHOR5)_____                 N      EDC(CGA):____

COMMENTS
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
REPORTED BY:                              REPORT DATE:
```

Illustration 35. Tokyo University Report Page



The OB user table fields will be shown only if the corresponding User Tables are filled up. UT_n and $Author_n$ are the names given to the OB User Tables by the user.

Tokyo University Report Page (cont'd)

Exam date, ID, Name, Referral, Referred For, Age, Gravida and Para: These fields are identical to the US report page as described on page 176.

Pregnancy Origin: In the pregnancy origin field, select either LMP, DGA, EDC or BBT. The selected field becomes active. Enter the date of origin of pregnancy as described below.

LMP: Enter the date from the first day of the patient's last menstrual period prior to pregnancy.

DGA: Enter the Diagnostic Gestational Age in Weeks and Days, Eg. 12W4D.

EDC: Enter the estimated date of confinement.



If the EDC has been calculated in the OB measurement menu, it automatically included in the report page.

BBT: Enter the date from the first day of the patient's LMP prior to pregnancy Eg. LMP date + 2 weeks.



If the four-digit format is used to enter 'YEAR', the system ignores the first two digits of the year.

The dates for LMP, EDC and BBT should be in the selected format Eg. YY/MM/DD (96/05/08). This format can be selected in the Installation Setup Menu by pressing *CONTROL S1*.

CGA?: The Composite Gestational Age is the average of the Gestational Ages calculated from different ultrasound measurements.

Indicate Y (Yes) if the measurement should be included, N (No) if the measurement should not be included and D (Delete) if the measurement should be deleted from the summary page. This response clears the result fields and deletes the measurement data and any ratio calculations involved.



Hints

'N' appears on the display by default if no measurements have been entered. 'Y' automatically replaces 'N' once a measurement has been entered. 'D' is reversible if the measurement has not been deleted from the averaging page.

Tokyo University Report Page (cont'd)

EFBW: Estimated Fetal Body Weight is automatically computed if BPD, APTD, TTD and FL measurements are made. If any of the above measurements are not available, the EFBW field will be blank. EFBW is calculated using the formula:

EFBW = 1.07xBPD^3+3.42xAPTDxTTDxFL

GA (Pregnancy Origin)

Depending on the parameter chosen for pregnancy origin the Gestational Age is calculated as described below.

GA (LMP): If LMP is selected in Pregnancy Origin, the field GA(LMP) appears. The Gestational Age by Last Menstrual Period is computed from the date of the first day of the Last Menstrual Period, according to the formula:

GA (LMP) = {Exam date} – {Last menstrual period}

GA (EDC)**:** If EDC is selected in Pregnancy Origin, the field GA(EDC) appears. The Gestational Age by Expected Date of Confinement is computed from the formula:

GA (EDC) = {EDC} + {Exam date} – {40 weeks or 41 weeks as selected in setup}

GA (BBT): The Gestational Age by Basal Body Temperature is computed using the formula:

GA (BBT) = {Exam date} – {BBT} + 2 weeks

CGA: The Composite Ultrasound Age is calculated using the formula

$$CGA = \frac{G_1 + G_2 + G_3 + ... + G_n}{n}$$

where G_1, G_2, ... G_n are the Gestational Ages obtained from the corresponding measurements selected for use in CGA calculation and n is the total number of such measurements used.

Tokyo University Report Page (cont'd)

EDC (Pregnancy Origin)

Depending on the parameter chosen for pregnancy origin the Expected Date of Confinement is calculated as described below.

EDC (LMP): If LMP is selected in Pregnancy Origin, the field EDC (LMP) appears. Estimated Date of Confinement is the Estimated Delivery Date computed from the date of the first day of the last Menstrual Period according to the formula:

EDC (LMP) = {LMP} + {40 weeks or 41 weeks as selected in setup}

EDC (DGA): If DGA is selected in Pregnancy Origin, it appears as EDC by DGA. Estimated Date of Confinement is computed using the formula:

EDC (DGA) = {Exam date} – {DGA} + {40 weeks or 41 weeks as selected in setup}

EDC (BBT): If BBT is selected in Pregnancy Origin, it appears as EDC by BBT. Estimated Date of Confinement is calculated from BBT using the formula:

EDC (BBT) = {BBT} + {38 weeks or 39 weeks as selected in setup}

EDC (CGA): Estimated Date of Confinement computed from Composite Gestational Age, and the formula is:

EDC (CGA) = {Exam date} – {CGA} + {40 weeks or 41 weeks as selected in setup}

Tokyo University Report Page (cont'd)

Other Fields

All other fields are similar to US report page except that Tokyo University tables are used in calculation of Gestational Age. The Mnemonic and Calculations names are given below in Table 14.

Calc Mnemonic	**Calc. Name**	**Input Measurements**	**Formula**	**Author Reference**
HR	Heart Rate (Beats/minute)	one 2 beat time (Measure manually or automatically)	HR[BPM]=120 [sec]/2beat time[sec]	n/a
GS	Gestational Sac	one distance		Tokyo University Method 1986, 6 by Univ. of Tokyo
CRL	Crown Rump Length	one distance		
FL	Femur Length	one distance		
BPD	Biparietal Diameter	one distance		
LV	Length of Vertebra	one distance		
APTD	Anteroposterior Trunk Diameter	one distance	APTD=input	
TTD	Transverse Trunk Diameters	one distance	TTD=input	
EFBW	Estimated Fetal Body Weight	Average BPD, Average of APTD, Average of TTD and Average of FL	EFBW=1.07x BPD^3+3.42 x APTD x TTD x FL	

Table 14.. Tokyo University Version Formulas

Osaka University Report Page

```
(OSAKA UNIV.) <EXAM DATE:XX/XX/XX>

ID :__________
NAME:_____________________________                    AGE :__
REFERRAL:_________________                          GRAVIDA :__
REFFERED FOR_____________                              PARA :__
PREGNANCY ORIGIN: 1 (1:LMP 2:DGA 3:EDC 4:BBT)         LMP:___

  MEASUREMENTS                      CGA?   CALCULATIONS:
CRL (OSAKA) _____                   N      EFBW     :_____          g
BPD (OSAKA) _____                   N      GA(EFBW) :_____
FTA (OSAKA) _____                   N      EFBW(IU)    :___         g
HL  (OSAKA) _____                   N      GA(EFBW IU) :___
FL  (OSAKA) _____                   N
                                           HR          :___bpm

                                           UT1/UT2     :___%
UT1 (AUTHOR1)                       N
UT2 (AUTHOR2)                       N
UT3 (AUTHOR3)                       N      GA(LMP)  :____
UT4 (AUTHOR4)                       N      CGA      :____
UT5 (AUTHOR5)                       N      EDC(LMP) :____
                                           EDC(CGA) :____

COMMENTS :
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

REPORTED BY:                                  REPORT DATE:
```

Illustration 36. Osaka University Report Page

The OB user table fields will be shown only if the corresponding User Tables are filled up. UT_n and $Author_n$ are the names given to the OB User Tables by the user.

Osaka University Report Page (cont'd)

Exam date, ID, Name, Referral, Referred For, Age, Gravida and Para: These fields are identical to the US report page as described on page 176.

Pregnancy Origin: The pregnancy origin field is similar to Tokyo University as described on page 185.

EFBW: The Estimated Fetal Body Weight is computed using two distance calculations (BPD & FL) and one area calculation (FTA).

Estimated Fetal Body Weight is automatically computed if the above measurements have been made. Calculations are made from the last measurement entered or averaged using the formula:

$$EFBW[g] = 1.25647 \times BPD[cm]^3 + 3.50655 \times FTA[cm^2] \times FL[cm] + 6.3$$

GA (EFBW): The Gestational Age by Estimated Fetal Body Weight is automatically computed if measurements for EFBW are already made (BPD, FL and FTA). Please refer to the EFBW (Osaka) table on page 342 for details.

EFBW (IU): If the standard deviation value for EFBW is greater than 1.5, the EFBW (IU) is computed using the formula: ;

$$EFBW(IUGR)[g] = 1.229 \times BPD[cm]^3 + 3.063 \times FTA[cm^2] \times FL[cm] – 24.6$$

GA (EFBW IU): Based on the calculations made for EFBW(IU), the GA by EFBW (IU) is automatically computed. Please refer to the EFBW (Osaka) table on page 342 for details.

Osaka University Report Page (cont'd)

Other Fields

All other fields are similar to US or Tokyo versions except that Osaka University tables are used in Gestational Age estimation. The Mnemonic and Calculation names are given below in Table 15.

Calc Mnemonic	**Calc. Name**	**Input Measurements**	**Formula**	**Author Reference**
HR	Heart Rate (Beats/minute)	one 2 beat time (Measure manually or automatically)	HR[BPM]=120 [sec]/2beat time[sec]	n/a
CRL	Crown Rump Length	one distance		Osaka University Method 1989, 3 by Univ. of Osaka
FL	Femur Length	one distance		
BPD	Biparietal Diameter	one distance		
HL	Humerus Length	one distance		
FTA	Fetal Trunk Cross sectional area	one area	APTD = input	
EFBW	Estimated Fetal Body Weight	Average BPD, Average of FTA, and Average of FL	EFBW=1.2564 7xBPD^3 + 3.50655 x FTA x FL + 6.3 (<5000g) IUGR=1.229 x BPD^3+3.063 x FTA x FL–24.6	

Table 15.. Osaka University Version Formulas

European Version Report Page

```
EXAM DATE:XX/XX/XX>
ID:_______________
NAME:_____________________________                          AGE:__
REFERRAL:_________________                                GRAVIDA:__
REFERRED FOR:_____________________________                   PARA:__
PREGNANCY ORIGIN: 1 (1:LMP 2:DGA 3:EDD 4:BBT)     LMP:_____

  MEASUREMENTS                      CGA?    CALCULATIONS:
GS  (TOKYO   )_______               N       BPD/OFD :____   HR:_____bpm
CRL (JEANTY  )_______               N       FL/BPD  :____%
BPD (JEANTY  )_______               N       FL/AC   :____%  EFW:____g
HC  (JEANTY  )_______               N       HC/AC   :____%(SHEP/WARS)
AC  (JEANTY  )_______               N       FL/Ft   :____%
FL  (JEANTY  )_______               N       BD/BPD  :____%
BD  (JEANTY  )_______               N       UT1/UT2 :____%
TAD (PARIS   )_______               N       GA(LMP) :____
OFD (SOSTOA  )_______               N       CGA     :____
Ft  (PARIS   )_______               N       LMP(OPE):____
UT1 (AUTHOR1 )_______               N       LMP(CGA):____
UT2 (AUTHOR2 )_______               N       BBT(LMP):____
UT3 (AUTHOR3 )_______               N       BBT(CGA):____
UT4 (AUTHOR4 )_______               N       EDD(LMP):____
UT5 (AUTHOR5 )_______               N       EDD(CGA):____

COMMENTS
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

REPORTED BY:                                        REPORT DATE:
```

Illustration 37. European Version Report Page

The OB user table fields will be shown only if the corresponding User Tables are filled up. UT_n and $Author_n$ are the names given to the OB User Tables by the user.

European Version Report Page (cont'd)

Exam date, ID, Name, Referral, Referred For, Age, Gravida and Para: These fields are identical to the US report page as described on page 176.

Pregnancy Origin: The pregnancy origin field is similar to Tokyo University and is described on page 185. Expected Date of Confinement (EDC) is referred here as Expected Date of Delivery (EDD).

CI: *Cephalic Index.* Ratio of BPD to OFD (Occipito Frontal Diameter) in percent.

$$\text{Cephalic Index (\%)} = 100 \times \text{BPD} / \text{OFD}$$

Cephalic index's normal value is $79 \pm 8\%$.



The HC should have been measured for calculation of Cephalic Index. The OFD is taken as the long axis of HC. If HC has been measured by the trace method then Cephalic Index will not be calculated.

FL/BPD: *Femur Length/Biparietal Diameter in percentage.* The displayed values are used for calculation. If either is missing, the field is blank. The normal ratio of FL/BPD is 79± 8% (23 weeks to term).

FL/AC: *Femur Length/Abdominal Circumference in percentage.* The displayed FL and AC values are used for the calculation. If either is missing, the field is blank. The normal ratio of FL/AC is 22± 2% (21 weeks to term).

HC/AC: *Head Circumference/Abdominal Circumference in percentage.* The displayed HC/AC values are used for the calculation. If either is missing, the field is blank. HC/AC normal ratio varies throughout the pregnancy.

FL/Ft: *Femur Length/Foot Distance.* FL/Ft is the ratio of femur length to Ft, in percent. The displayed values are used for calculation. If either is missing, the field is blank.

BD/BPD: *Binocular Distance/Biparietal Diameter.* BD/BPD is the ratio Binocular Distance to Biparietal Diameter in percent. The displayed values are used for calculation. If either is missing, the field is blank.

European Version Report Page (cont'd)

EFW: The Estimated Fetal Weight is arrived at by four possible methods: BPD and AC (Shepard/Warsoff), BPD and AC (Shepard:Richdards/ Berkowitz), FL, AC and HC (Hadlock, Radiology 150:535:1984) and BPD and TAD (German). The selection is made in the European OB Table Setup by pressing *CONTROL S2*. For details of the model chosen and the formulas used, refer to page 152.

Other Fields

All other fields are similar to US or Tokyo versions except that European Tables as chosen in the European OB Table Setup, are used in Gestational Age estimation. The Mnemonic and Calculation names are given below in Table 16.

Calc Mnemonic	Calc Name	Input Measurements	Formula	Author Reference
GS	Gestational Sac	one distance	Refer to Chapter OB Tables on page 329.	Tokyo University Method 1986, 6 by Univ. of Tokyo
CRL	Crown Rump Length	one distance	Refer Chapter OB Tables on page 329.	JEANTY : Radiology, 143 : 513, 1982
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	
HC	Head Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	
AC	Abdominal Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	
FL	Femur Length	one distance	Refer Chapter OB Tables on page 329.	
BD	Binocular Distance	one distance	Refer Chapter OB Tables on page 329.	

Table 16.. European Version Formulas

European Version Report Page (cont'd)

Calc Mnemonic	Calc Name	Input Measurements	Formula	Author Reference
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	CAMPBELL : King's College Hosp. London (Am.J. obst gynecol). Oct. 1, 1982
FL	Femur Length	one distance	Refer Chapter OB Tables on page 329.	
BD	Binocular Distance	one distance	Refer Chapter OB Tables on page 329.	
GS	Gestational Sac	one distance	Refer Chapter OB Tables on page 329.	HANSMANN: M and Al : Geburtsch, u, Frauenheilk 39 : 656, 1979
CRL	Crown Rump Length	one distance	Refer Chapter OB Tables on page 329.	
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	
HC	Head Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	
AC	Abdominal Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	
FL	Femur Length	one distance	Refer Chapter OB Tables on page 329.	
TAD	Transverse Abdominal Diameter	one distance	Refer Chapter OB Tables on page 329.	
OFD	Occipito Frontal Diameter	one distance	Refer Chapter OB Tables on page 329.	
CRL	Crown Rump Length	one distance	Refer Chapter OB Tables on page 329.	ROBINSON : Robinson and Al : BrJGynecol, 82 : 702, 1975

Table 16. European Version Formulas (cont'd)

European Version Report Page (cont'd)

Calc Mnemonic	Calc Name	Input Measurements	Formula	Author Reference
CRL	Crown Rump Length	one distance	Refer Chapter OB Tables on page 329.	Paris
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	
TAD	Transverse Abdominal Diameter	one distance	Refer Chapter OB Tables on page 329.	
BD	Binocular Distance	one distance	Refer Chapter OB Tables on page 329.	
FL	Femur Length	one distance	Refer Chapter OB Tables on page 329.	
Ft	Foot Distance	one distance	Refer Chapter OB Tables on page 329.	Paris
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	SOSTOA : Hospital de la Santa Cruzy San Pablo. servieio de obst. y gynecol.
HC	Head Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	
AC	Abdominal Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	
FL	Femur Length	one distance	Refer Chapter OB Tables on page 329.	
BD	Binocular Distance	one distance	Refer Chapter OB Tables on page 329.	
OFD	Occipito	one distance	Refer Chapter OB Tables on page 329.	
FL	Femur Length	one distance	Refer Chapter OB Tables on page 329.	Hadlock, AJR, 138 : 875, 1982

Table 16. European Version Formulas (cont'd)

European Version Report Page (cont'd)

Calc Mnemonic	Calc Name	Input Measurements	Formula	Author Reference
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	Hadlock, JUM, 1 : 97, 1982
AC	Abdominal Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	Hadlock, AJR, 139 : 367, 1982
HC	Head Circumference	circumference by trace, ellipse, circle or two distances	Refer Chapter OB Tables on page 329.	Hadlock, AJR, 138 : 649, 1982
CRL	Crown Rump Length	one distance	Refer Chapter OB Tables on page 329.	NELSON
BPD	Biparietal Diameter	one distance	Refer Chapter OB Tables on page 329.	KURTZ
BD	Binocular Distance	one distance	Refer Chapter OB Tables on page 329.	BERKOWITZ
TAD	Transverse Abdominal Diameter	one distance	Refer Chapter OB Tables on page 329.	ERIKSEN
EFW	Estimated Fetal Weight	Average of BPD and Average of AC [cm]	EFW[g] = 10 ^ (1.7288 + 0.09184*BPD + (0.02581* AC) + (0.00011*BPD* AC))	Shepard/ Warsoff

Table 16. European Version Formulas (cont'd)

European Version (cont'd)

Calc Mnemonic	Calc Name	Input Measurements	Formula	Author Reference
EFW	Estimated Fetal Weight	Average of BPD and Average of TAD [mm]	EFW[kg] = 0.515263 – (0.105775*BPD) +(0.000930707* $(BPD)^2$) + (0.0649145*TAD) – (0.00020562* $(TAD)^2$)	German
EFW	Estimated Fetal Weight	Average of BPD and Average of AC [cm]	EFW [g] = 10^(3–1.7492 + 0.046*AC + 0.166*BPD – 0.002646*AC*BPD)	Shepard : Richards/ Berkowitz
EFW	Estimated Fetal Weight	Average of FL, Average of AC and Average of HC [cm]	EFW [g] = 10^(1.5662 – (0.0108*HC) + (0.0468*AC) + (0.171*FL) + $(0.00034*(HC)^2)$ – (0.003685*AC*FL))	Hadlock, Radiology, 150 : 535, 1984
FL/AC	FL/AC ratio	Average of FL and Average of AC	FL/AC	Hadlock, AJR, 141 : 979, 1983
FL/HC	FL/HC ratio	Average of FL and Average of HC	FL/HC	Hadlock, JUM, 3 : 439, 1984
FL/BPD	FL/BPD ratio	Average of FL and Average of BPD	FL/BPD	Hadlock, AJOG, 141 : 759, 1987
CI	Cephalic Index	Average of BPD and Average of OFD	BPD/OFD short distance HC/long distance HC	Hadlock, AJR, 137 : 83, 1981
HC/AC	HC/AC ratio	Average of HC and Average of AC	HC/AC	Campbell, BRJ.OG, 84 : 165, 1977
FL/Ft	FL/Ft ratio	Average of FL and Average of Ft	FL/Ft	
BD/BPD	BD/BPD ratio	Average of BPD and Average of BD	BD/BPD	

Table 16. European Version Formulas (cont'd)

Australian Version Report Page

<EXAM DATE:XX/XX/XX>

ID :_____
NAME :_____ AGE:__
REFERRAL:_____ EGA:_____ GRAVIDA:__
REFERRED FOR:_____ PARA:__
LMP:_____

MEASUREMENTS		CUA?	CALCULATIONS:	
BPD (ASUM)	_____	N	CI	:___%
HC (HADLOCK)	_____	N	FL/BPD	:___%
OFD (HC)	_____		FL/AC	:___%
AC (ASUM)	_____	N	HC/AC	:___%
TAD (AC)	_____		UT1/UT2	:___%
APD (AC)	_____		EFW	:_____g
FL (HADLOCK)	_____	N		
CRL (ASUM)	_____	N	HR:___bpm	AFI:___cm
	_____		GA(LMP)	:____
UT1 (AUTHOR1)	_____	N	CUA	:____
UT2 (AUTHOR2)	_____	N	LMP(EGA)	:____
UT3 (AUTHOR3)	_____	N	LMP(CUA)	:____
UT4 (AUTHOR4)	_____	N	EDD(EGA)	:____
UT5 (AUTHOR5)	_____	N	EDD(LMP)	:____
			EDD(CUA)	:____

COMMENTS
_____
_____
_____
REPORTED BY: REPORT DATE:

Illustration 38. Australian Version Report Page

The OB user table fields will be shown only if the corresponding User Tables are filled up. UT_n and $Author_n$ are the names given to the OB User Tables by the user.

All fields are identical to US report page as described on page 176. BPD, CRL and AC measurements alone use Australian tables instead of Hadlock tables. Refer to the OB Tables section on page 329 for details.

Measurement Averaging Page

Overview

The Measurement Averaging Page enables the display and selection of measurement values, that will be included or excluded from the data, to be used in the calculation of results displayed on the main OB Report Page. Press the *RIGHT* or *LEFT ROTATE* keys while displaying the OB Report Page to display the Measurement Averaging Page. Press the *RIGHT* or *LEFT ROTATE* keys again to exit the Measurement Averaging Page.

The choices to be entered on the Report Display are:

Y – Use this measurement for averaging

N – Do not use this measurement for averaging

D – Erase or delete this measurement



If there is no measurement with a 'Y', the average will not be displayed.

U.S. and Australian Versions

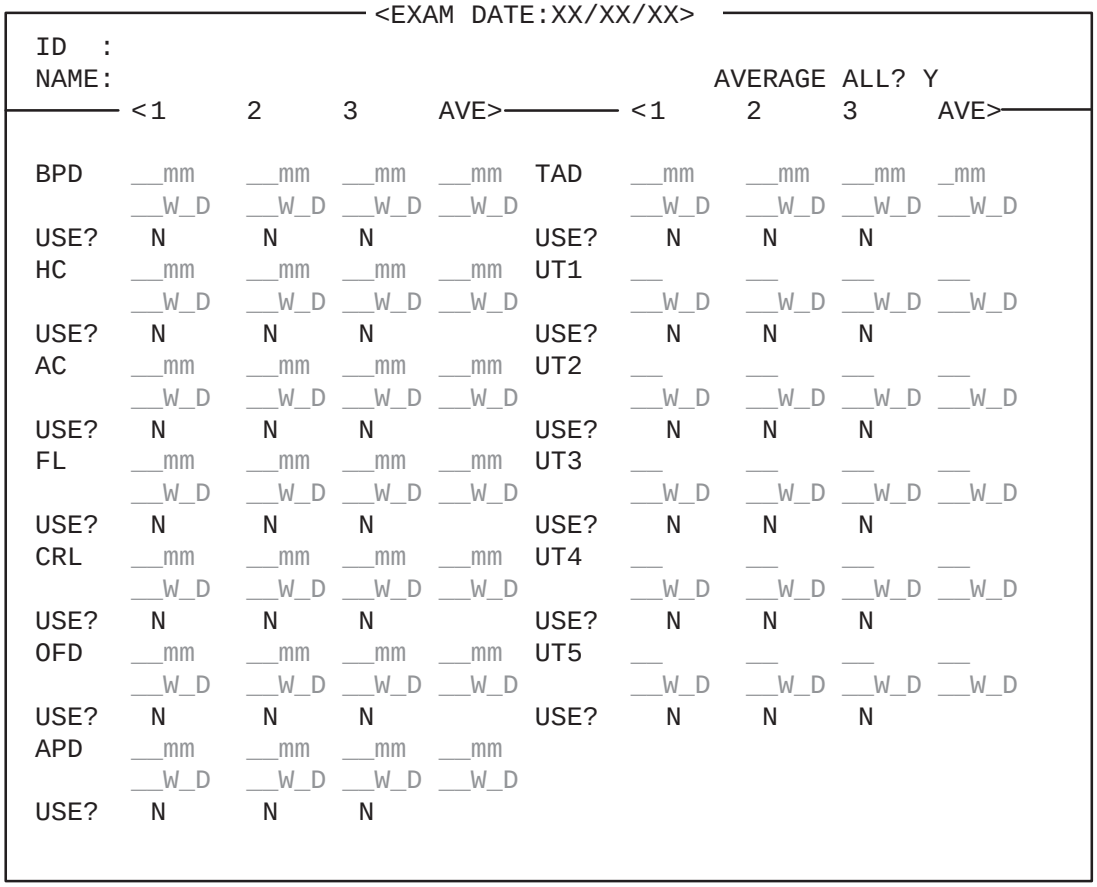

<EXAM DATE:XX/XX/XX>
ID :
NAME:
AVERAGE ALL? Y
<1 2 3 AVE>
<1 2 3 AVE>
BPD __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
HC __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
AC __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
FL __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
CRL __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
OFD __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
APD __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
TAD __mm __mm __mm _mm
__W_D __W_D __W_D __W_D
USE? N N N
UT1 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT2 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT3 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT4 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT5 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N

Illustration 39. Measurement Averaging Page - U.S. and Australian Versions

Tokyo University Version

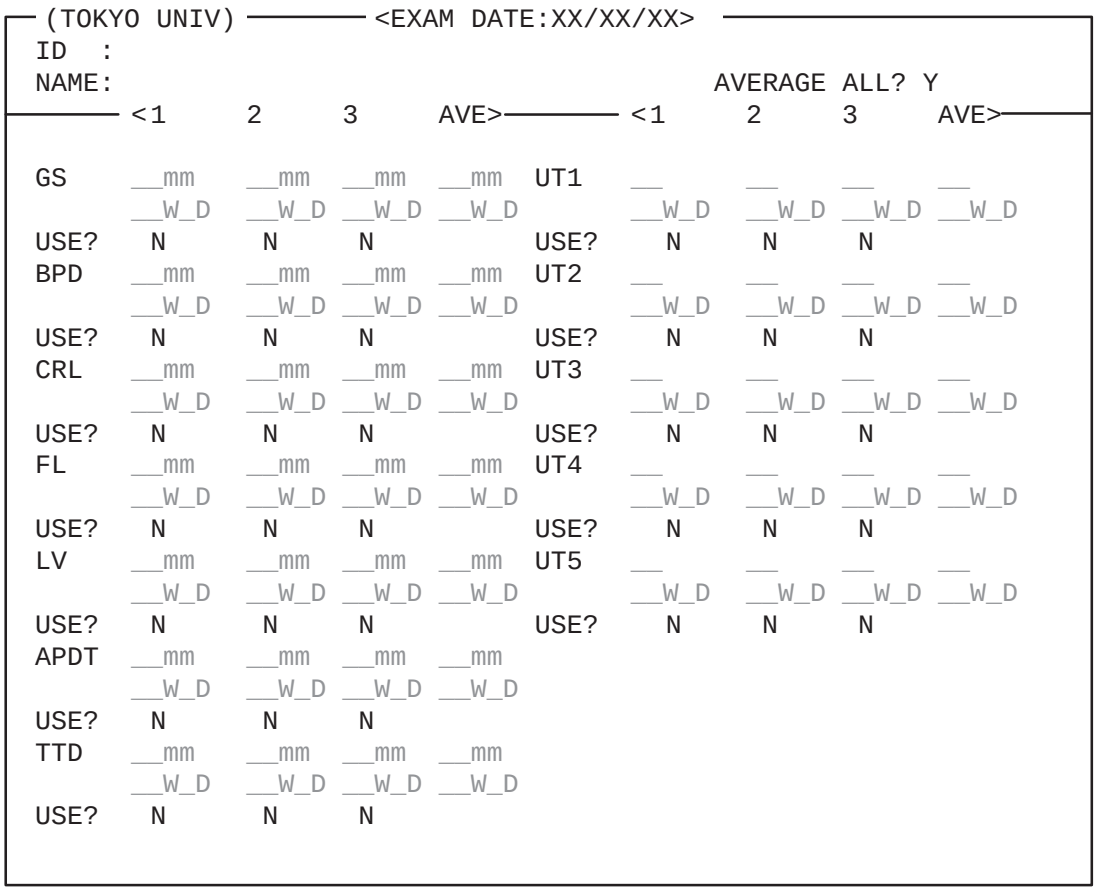

(TOKYO UNIV)
<EXAM DATE:XX/XX/XX>
ID :
NAME:
AVERAGE ALL? Y
<1 2 3 AVE>
<1 2 3 AVE>
GS __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
BPD __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
CRL __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
FL __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
LV __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
APDT __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
TTD __mm __mm __mm __mm
__W_D __W_D __W_D __W_D
USE? N N N
UT1 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT2 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT3 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT4 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N
UT5 __ __ __ __
__W_D __W_D __W_D __W_D
USE? N N N

Illustration 40. Measurement Averaging Page - Tokyo University Version

Osaka University Version

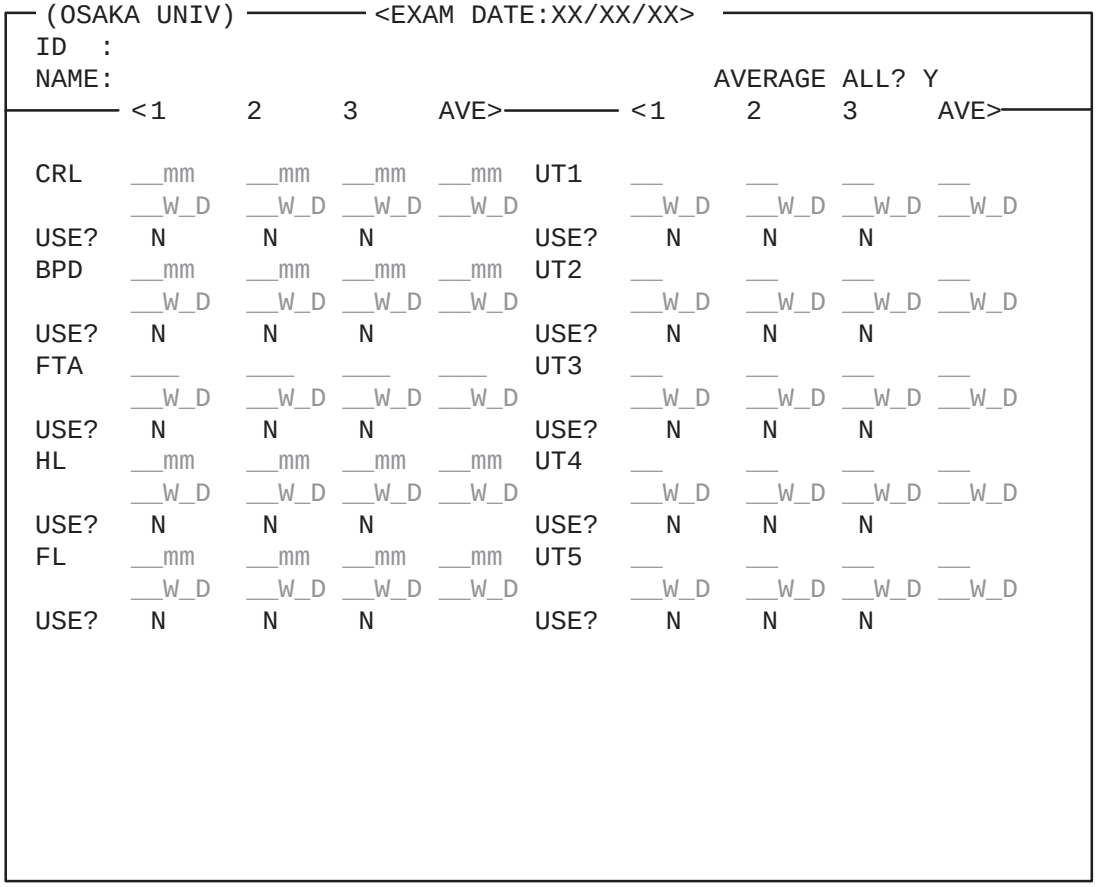


Illustration 41. Measurement Averaging Page - Osaka University Version

European Version

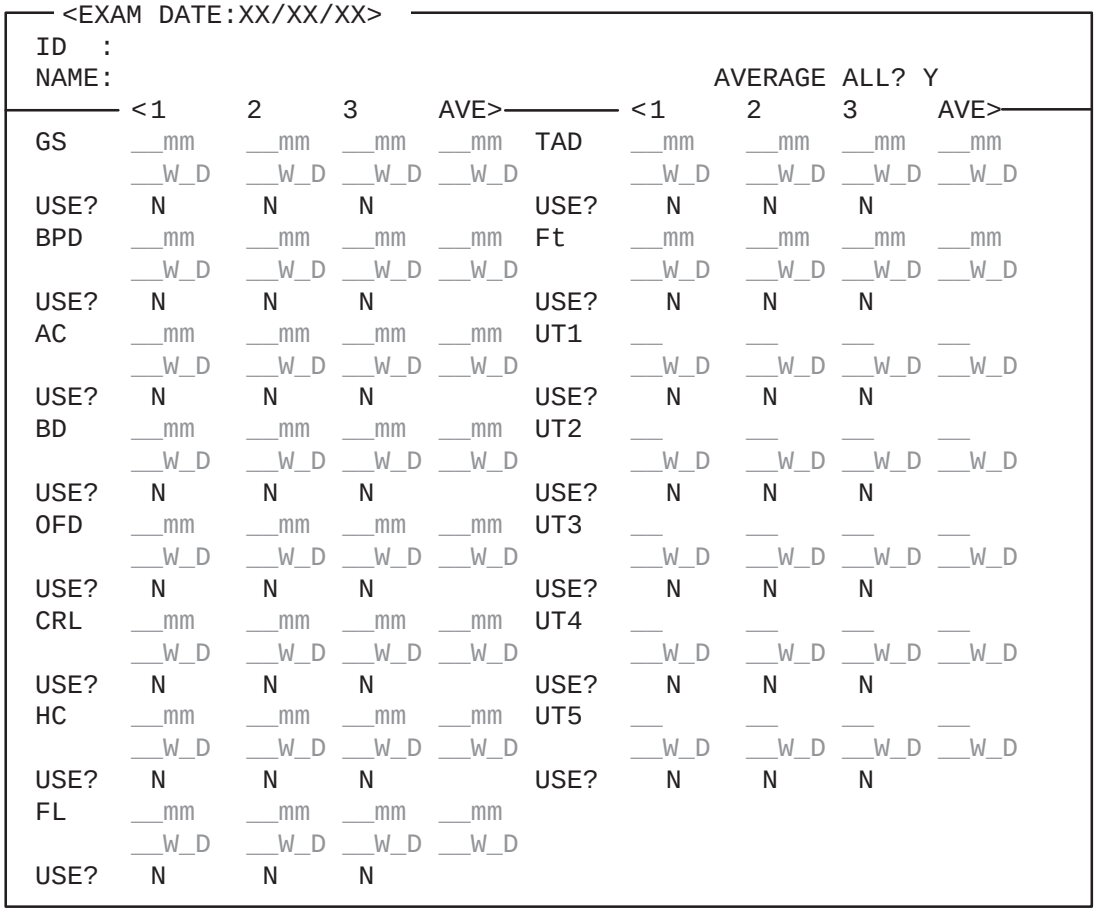


Illustration 42. Measurement Averaging Page - European Version

Editing the Measurement Averaging Page

Edit the Measurement Averaging Page in the same manner as the OB Report Page. Use the *TRACKBALL, SHIFT* ←↑↓→ or *RETURN* keys. Only USE fields can be edited. Measurements displayed on the report cannot be edited. However, if 'N' or 'D' is entered in the USE field, this could exclude or delete specific measurements.

Average All

The default state for the measurement USE fields is selected by the "AVERAGE ALL" field. The "AVERAGE ALL" field is non-volatile and will be remembered even after power down.

If the "AVERAGE ALL" field is 'N' (no) then the default for the current measurement is 'Y' (yes) and the two prior measurements will be 'N'. 'N' is the factory and service default setting for the AVERAGE ALL field. If the Measurement Averaging Page is never used, the AVERAGE ALL selection is likely to be 'N' (no).

If the AVERAGE ALL field is set to 'Y', the default for all measurement USE fields will be 'Y'. It is assumed that all measurements (up to three) will be averaged as a matter of regular procedure.

Anatomical Survey Page

Overview

The Anatomical Survey Page provides a checklist that promotes routine reporting of obstetrical ultrasound exams. To reach the page, press RIGHT or LEFT *ROTATE* keys to enter from the OB Report Page to the Measurement Averaging Page and finally to the Anatomical Survey Page. Follow the reverse process to exit out of the Anatomical Survey Page.

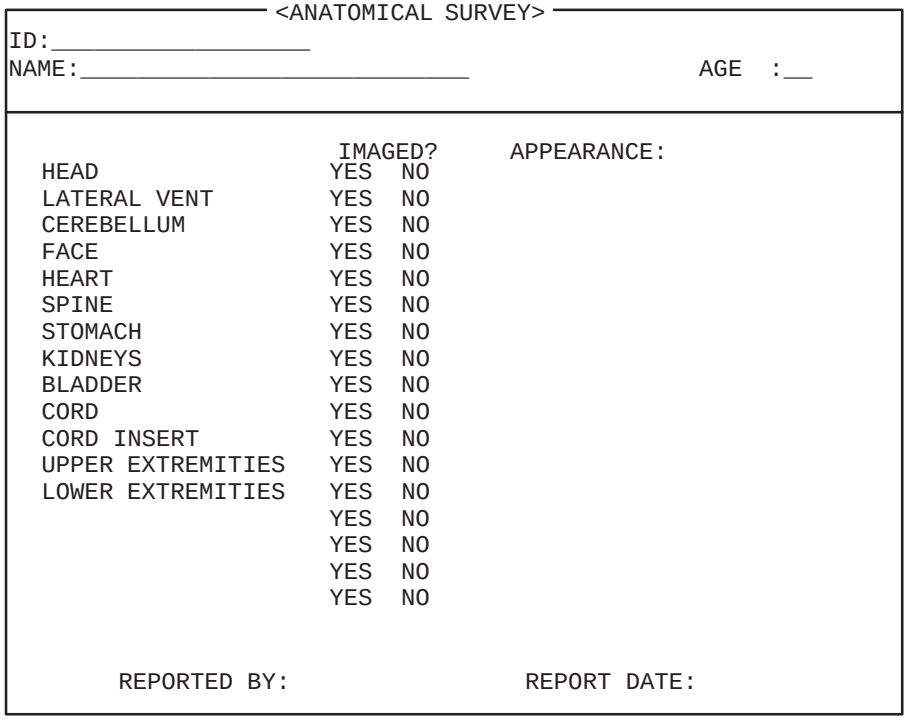


Illustration 43. Anatomical Survey

Editing the Anatomical Survey Page

The patient data on the Anatomical Survey page cannot be edited, this data must be edited in the New Patient/ID Name window.

The cursor appears by default at the 'YES/NO' field on the first feature of the checklist. Edit the Anatomical Survey page in the same manner as the OB Report Page. Use the *TRACKBALL, SHIFT* ←↑↓→ or *RETURN* keys. Yes/No is selected for the active anatomical feature by pressing 'Y' for selection or 'N' for no selection.

If 'Yes' is selected, then the 'No' will be erased. The cursor will automatically move to the 'Appearance' field. Up to 24 characters can be entered in the Appearance field.

In either case the cursor will move to the 'Yes/No' field for the next item on the checklist.

User Features

The user can edit up to four additional anatomical features to the list. Use the *TRACKBALL, SHIFT* ↑←→↓ or *RETURN* keys to move to a blank field.

Type in the desired anatomical feature designation. Edit the YES/NO and Appearance fields as indicated above.



The four additional anatomical features edited by the user will NOT be retained when the system is turned OFF.

This page left blank intentionally.

OB User Table

Overview

With the advancement of sonography numerous obstetric tables specific for certain racial or geographical populations have evolved. These offer advantage in form of higher calculation accuracies (such as estimated fetal birth weight) and in earlier diagnosis (such as intra–uterine growth retardation) compared to other tables constructed from a genetically different or heterogeneous population.

Specifications

- Logiq α100 Version 4 offers 5 OB user tables
- The input parameter could be one among the following types:
  1) Distance
  2) Circumference
  3) Area
- The variation of input parameter can be one among the following:
  1) Range (time)
  2) Standard deviation.
- The output parameter is Calculated Gestational Age.
- The statistical expression of the output can be one among the following formats:
  1) Range (time)
  2) Standard deviation
  3) Percentile score.
- Linear interpolation to determine missing data points.

The OB User Table

The user table Editor is shown below.

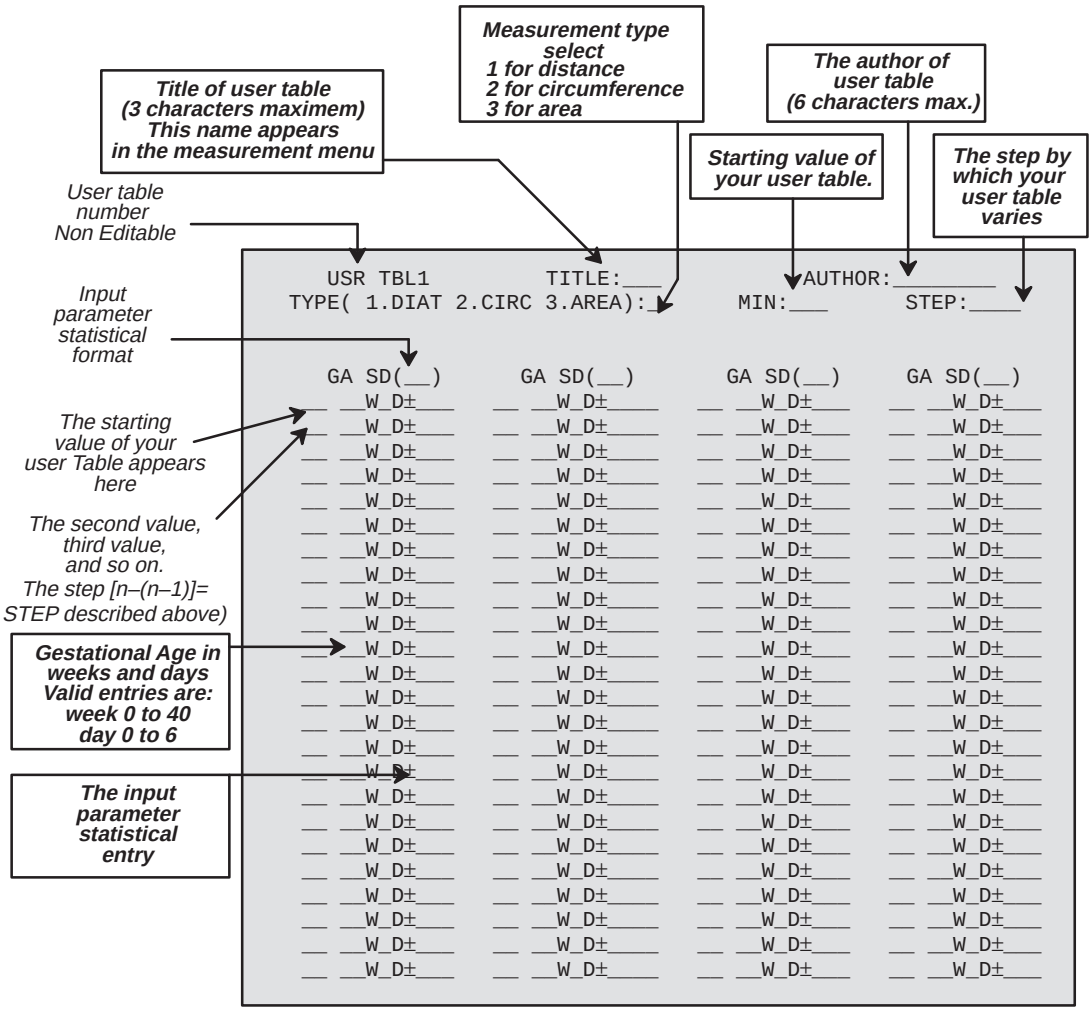

Measurement type select
1 for distance
2 for circumference
3 for area
The author of user table (6 characters max.)
Title of user table (3 characters maximem) This name appears in the measurement menu
Starting value of your user table.
The step by which your user table varies
User table number Non Editable
USR TBL1 TITLE:___ AUTHOR:_____
TYPE(1.DIAT 2.CIRC 3.AREA):_ MIN:___ STEP:____
Input parameter statistical format
GA SD(__) GA SD(__) GA SD(__) GA SD(__)
The starting value of your user Table appears here
The second value, third value, and so on.
The step [n–(n–1)]= STEP described above)
Gestational Age in weeks and days Valid entries are: week 0 to 40 day 0 to 6
The input parameter statistical entry

Illustration 44. OB user Table Editor



Italic descriptives denote non–editable fields.
Italic Bold descriptives denote editable fields.

Entering an OB Table

Obtain an OB table data sheet of your preference. the statistical type of the data sheet has to be identified before the data can be copied to the system.

Identifying the Statistical Type

The statistical expression of variation of input parameter has to be obtained. The variation of input parameter can either be:

1. Range of Calculated Gestational Age (e.g. US table)
   OR
2. Standard deviation of input parameter (e.g. Europe, Osaka tables).

This information is usually provided by the author of the OB table.

Choosing the Statistical Expression of Output (CGA)

The ultimate aim of the user table is to not only give the accurate Gestational Age for a sonographic measurement, but also give reliable information on whether the measurement is normal for the DGA or otherwise. The statistical expression of the output (Calculated Gestational Age) can be in one of the following formats:

- Range (time) *Eg. GA = 4w2d ±2d*
- Percentile Score *e.g. GA = 4w2d55%*
- Standard deviation *Eg. GA = 4w2d+.4sd*
  GA = 4w9d–1.3sd

Choosing the Statistical Expression of Output (CGA) (continued)

Range (time)

This format displays the normal range of GA for a particular obstetric measurement. It does not give information on whether the fetus is normal for date or not.

Percentile Score

The percentile score not only describes whether the fetus is normal but also shows tangibly where exactly it stands in a percentile ranking.
A percentile score of 50% is right in middle. A score below 10th percentile is considered small for date and a score above 90 is considered large for date.

Standard Deviation

This format gives the gestational age and the normalcy of growth in statistical parlance. It expresses the discrepancy between DGA and sonological measurement in form of *'number of times the standard deviation (σ times)'.* A difference of up to 2 standard deviations (2σ) is considered normal. σ *times* above 2 is considered large for date and σ *times* below 2 is considered small for date as far as the particular sonographic measurement is considered.
σ *times* is calculated using the formula:

$$\sigma \text{ times} = \frac{x_{table} - x}{\sigma}$$

σ = *standard deviation for DGA as in data sheet*
x_{table} *is the data sheet value for DGA*
x *is the sonographically measured parameter*

Choosing the Statistical Expression of Output (CGA) (continued)

Choosing the Output Format

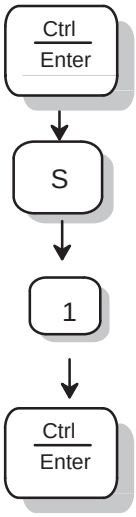
The statistical expression of the output depends on the statistical format of the input parameter.

Output Format	Variation of input parameter should be of type	Remark
Range (time)	Range (time)	Similar to US, Tokyo and Australia.
Standard Deviation	Standard Deviation	Similar to Osaka
Percentile Score	Standard Deviation	Similar to Europe



Choose the output format before copying data from data sheet to system. Output format once chosen for a table will remain so until entirely erased. For erasing a table please refer page 218)
To choose the format you need to enter installation setup.

Choosing the Statistical Expression of Output (CGA) (continued)



Select *CONTROL.*

Select *S*

Select *1* to chose installation setup

Press *ENTER* to go to installation setup. The following screen appears:

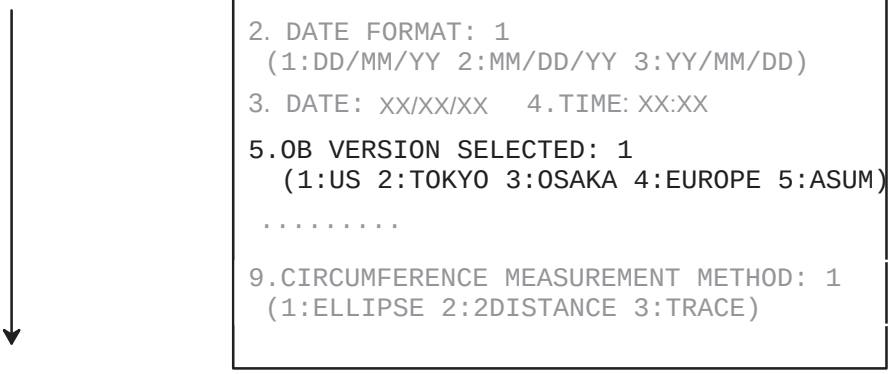
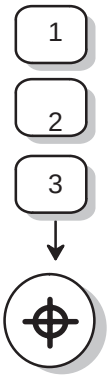


Illustration 45. Installation setup window



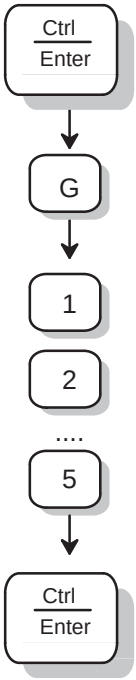
In the OB version option:
Select ‘1’ US (Or Australian or Tokyo) for Statistical expression of output as range (time).
Select ‘2’ Osaka for output format as Standard Deviation.

Select ‘3’ Europe for output format as Percentile Score.

Press SET to save and exit.

Copying data from Data Sheet to System

This is the final part of entering your user table. You need to copy data from your data sheet to the system. A user friendly Table Editor makes this task convenient.



Invoke the Table Editor using the following keys.
Select *CONTROL*

Select G

Select 1 to choose user table 1

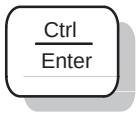
Select 2 to choose user table 2
....

Select 5 to opt for user table 5.

Select ENTER to invoke the table editor. A screen similar to Illustration 44 appears.

The TRACKBALL, SHIFT←↑↓→, RETURN and SPACE can be used to move about the table.
Use the alpha numeric keys to enter values.
To delete a wrong entry use BACK–SPACE.

Fill up the title, author, type of input parameter, minimum value, maximum value and step by which the input parameter varies as given in the data sheet. Copy the data to the system.



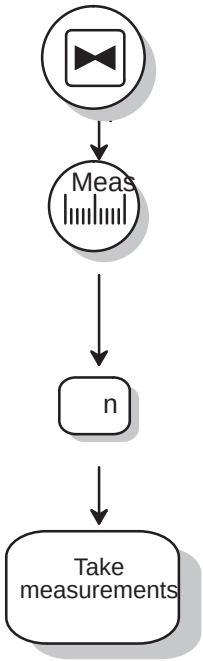
To save and exit the Table Editor select *ENTER.*

Linear Interpolation

The linear interpolation facility offers advantage in form of calculating gestational age, range and standard deviation for measurement values that are not in the user table.
Illustration: Consider the case where the STEP in your user table is 5mm. Then for every four of the five obstetric measurements the table gestational age is missing. Using linear interpolation the system calculates gestational age, range and standard deviation for the intervening measurement values.

Measurement with User Tables

Ensure that the diagnostic category is OB. (For details on "Diagnostic Category" please refer page 125).



Scan and obtain a frozen section corresponding to the input parameter in the user table.

Select measurement.
The OB user table menu appears as below. (UT*n* will be replaced by the table title if entered.

```
MEAS:1:UT1 2:UT2 3:UT3 4:UT4 5:UT5
```

Select the appropriate numeric key.
If the appropriate measurement is already done then the calculation result is displayed by selecting the numeric key.

Take necessary measurements i.e. distance, circumference or area in accordance to the user table input parameter.

On completing measurement the Estimated Gestational Age and accuracy is displayed on the left side of the screen.
Up to four measurements (two in the case of percentile display) can be displayed in the calculation result area.

Invoking the Report Page

The user table measurements are automatically incorporated in the OB report and averaging pages. They appear below the standard OB measurements irrespective of version chosen.

An additional item in form of ratio between user table #1, and user table number #2 is present in the report page. When both tables are entered and both measurements are made the ratio is calculated and displayed automatically.
The user table calculations that appear in report page (US version) is shown below.

<EXAM DATE:XX/XX/XX>

```
ID   :____________________
NAME  :____________________                              AGE:__
REFERRAL:____________________          EGA:________    GRAVIDA:__
REFERRED FOR:___________                                 PARA:__
LMP:________
```

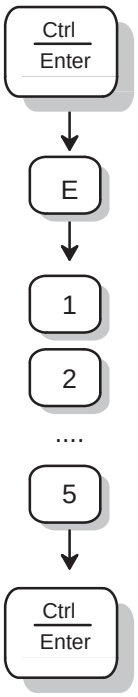
MEASUREMENTS	CUA?	CALCULATIONS:
BPD (HADLOCK) _____	N	CI :___%
HC (HADLOCK) _____	N	FL/BPD :___%
OFD (HC) _____		FL/AC :___%
AC (HADLOCK) _____	N	HC/AC :___%
TAD (AC) _____		UT1/UT2 :___%
APD (AC) _____		EFW :_____g
FL (HADLOCK) _____	N	
CRL (HADLOCK) _____	N	HR:___bpm AFI:___cm
_____		GA(LMP) :____
UT1 (AUTHOR1) _____	N	CUA :____
UT2 (AUTHOR2) _____	N	LMP(EGA) :____
UT3 (AUTHOR3) _____	N	LMP(CUA) :____
UT4 (AUTHOR4) _____	N	EDD(EGA) :____
UT5 (AUTHOR5) _____	N	EDD(LMP) :____
		EDD(CGA) :____

```
COMMENTS
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
REPORTED BY:                              REPORT DATE:
```

Illustration 46. Report Page with OB User Table Measurements

User tables will be shown in the report and average pages only if the values have been entered.

Erasing a User Table



To permanently erase a User Table from the system use **CONTROL–E** sequence.

Select *E*

Select the user table number you want to erase.

Select *ENTER* to erase that User Table.

The table once cleared is available for entering new OB tables.

Cardiology

Cardiac Measurements

This section describes the Cardiology Measurements and Calculations available.

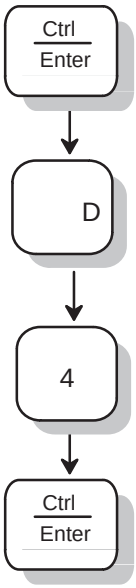
This page left blank intentionally.

Cardiac Measurements

Cardiology Diagnostic Category

The Cardiology Diagnostic Category offers:

- Optimization of image quality for echocardiography.
- Measurement menu consisting of cardiology and general measurement.



To select the Cardiology Diagnostic Category, press CONTROL

Select D

Select 4

Press ENTER

Measurements

The following measurements are possible in the cardiac package.

M–Mode and B/M–Mode

- Amplitude measurement
- Velocity measurement
- Time measurement
- LVIDd
- LVIDs
- Heart rate

B–Mode

- Circumference and area measurement by two distances, ellipse and trace.
- Volume measurement.



NOTE: In B/M–Mode the B–Mode measurements can be made only on the B–Mode area of the screen; similarly the M–Mode measurements can be made only on the M–Mode screen area.
The M–Mode measurements cannot be performed in a B or B/B screen area and vice versa.

Cardiology Menu



While scanning, press the *MEASUREMENT* key to display the cardiology measurements menu at the bottom of the screen. The menu comes in two pages.

```
MEAS:1:C&A 2:VLM 3:HR 4:VEL 5:A/B 6:TM                    0:NXT
```

```
MEAS:1:CUBED 2:TEICH 3:LVIDd 4:LVIDs 5:HR                 0:NXT
```

Mnemonic	Measurement Name
1. C&A	Circumference and area
2. VLM	Volume
3. HR	Heart rate
4. VEL	Velocity
5. A/B	A/B ratio
6. TM	Time measurement
0. Next	Toggles to next page of menu.

Mnemonic	Measurement Name
1. Cubed	Calculation of LV volume by cubed method
2. Teich	Calculation of LV volume by Teichholz formula
3. LVIDd	LV internal dimension at diastole
3. LVIDs	LV internal dimension at systole
4. HR	Heart rate
0. Next	Toggles to next page of menu.

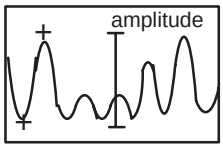


To select a particular measurement, press the corresponding numeric key. The item gets highlighted.



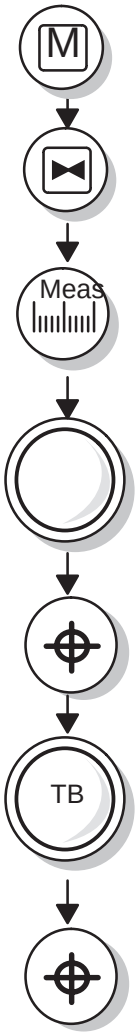
To obtain the Cardiology Menu ensure that the Diagnostic Category selected is Cardiology (see page 125 for details on Diagnostic Category)

Amplitude measurement



The default measurement in M–Mode is amplitude.

The amplitude of a moving cardiac structure is the greatest distance it has moved in a well defined phase of the cardiac cycle and is expressed in millimeters. Amplitude measurements are done only in M–Mode.



Perform a scan in B/M or M–Mode.

Press *FREEZE* to stop image acquisition.

Press the MEASUREMENT key once to display the measurement menu and an open ended “><” cursor appears on the screen.

Use the *TRACKBALL* to move the open ended “><” cursor to the amplitude measurement start point.

Press set to fix the measurement start point. A second cursor appears. Amplitude in mm appears on the left side of the screen.

Use the *TRACKBALL* to move the second open ended “><” cursor to the measurement end point.

Press *SET* to complete the measurement. The amplitude value is displayed in mm on the left of the screen. Repeat the same procedure to make more amplitude measurements, if required. ***Up to 4 measurements will be displayed in mm at a time.***

Volume (cm^3)

Using B-Mode or dual B-Mode, scan the heart in two planes at right angles to each other, like the two chamber and four chamber views for LV volume measurement.

Freeze at an appropriate point of the cardiac cycle like systole, etc. The Volume can be calculated using three models.

For details of calculating volume of three dimensional structures using different formulae refer to page 110 in General Measurements chapter.



NOTE: The measurements are done in B, B/B or B–Mode area of B/M–Mode. If measurements are done in the wrong mode an error message will appear on the left side of the screen as ILG.

Basic Measurements in Cardiology Menu

For measurement procedures of Circumference and Area (C&A), Heart Rate (HR), Velocity (VEL), A/B Ratio (A/B) and Time (TM), please refer to the General Measurements Chapter on page 97.

Left Ventricle Function Measurement

The following M Mode left ventricle (LV) functions can be measured.
1. LV End Diastolic Volume
2. LV End Systolic Volume
3. Stroke Volume
4. Ejection Fraction
5. Cardiac Output

LV End Diastolic Volume (EDV)

The EDV is the volume of the LV at the end of diastole. It corresponds to the PR interval in ECG.

LV End Systolic Volume (ESV)

The ESV is the volume of the LV at the end of systole. It corresponds to the T wave in ECG.

Two formulas are available for calculation of the LV volumes.
1. Cubed formula
2. Teicholz formula

Cubed formula

The cubed formula calculates the LV volume using the equation:

$volume = (Internal\ dimension)^{3.}$

The measurement that has to be given are LV internal dimensions at systole (LVIDs) and at diastole (LVIDd).

Teichholz formula

The Teicholz formula calculates the LV volumes using the formula

$$Volume = \frac{7 \times dimension^3}{2.4 + dimension(mm)}$$

The measurement that has to be given are LV internal dimensions at systole (LVIDs) and diastole (LVIDd).

Stroke Volume (SV)

Stroke volume is the volume of blood pumped by the heart in a single beat. It is equal to the difference between the LV end diastolic and end systolic volumes and is expressed in milliliters.

$$SV = EDV–ESV(ml).$$

Ejection fraction (EF)

Ejection fraction is the fraction of blood effectively pumped out of the heart in one beat. It is equivalent to the stroke volume divided by end diastolic volume. It is expressed as a percentage.

$$EF = \frac{SV}{EDV} \times 100(\%)$$

Cardiac output (CO)

Cardiac Output is the volume of blood pumped by the heart in one minute. It is equivalent to stroke volume times heart rate. It is expressed in liters per minute

$$CO = \cdot SV \times HR \ (litres/min)$$

Measurement of LV Functions



Freeze the image in B/M or M Mode.

Press the measurement key. The cardiac menu appears at the bottom of the screen.

Select either the Cubed or Teichholz formula by pressing the appropriate numeric keys.
The LV function list is displayed on the lower left portion of the screen and the item LVIDd is highlighted.

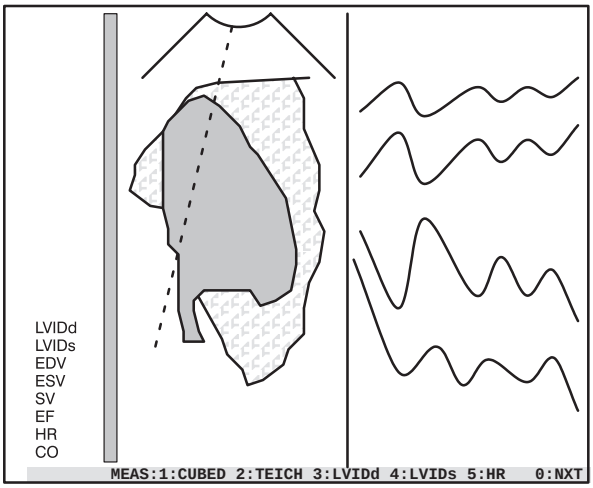


Illustration 47. B/M Screen with LV Calculation Menu

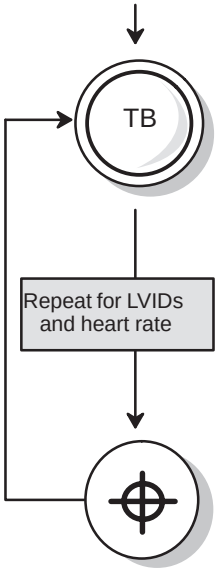
Simultaneously an open ended "><" cursor with a vertical broken line appears on the screen

Use the Trackball to move the cursor to the point of end diastole (posterior wall).

Press Set to fix the start point of LV dimension measurement. A second open ended "><" cursor appears. This cursor is restricted in the vertical direction only.

ta

Measurement of LV Functions (cont'd)



Use the Trackball to move the second cursor to the point of diastole on the diametrically opposite wall (inter ventricular septum).

Press Set. The measurement is completed and the dimension appears besides the LVIDd item.

The EDV is calculated and displayed simultaneously besides the EDV item.

Simultaneously a third cursor appears and the highlighted item on the list shifts to LVIDs.

Repeat measurements as above.

On completion the measurement is recorded in LVIDs and the calculated ESV, SV and EF are displayed along side their respective items.

A fifth cursor appears and the highlighted item in the menu is heart rate (HR).
Measurement of heart rate is by the same procedure as mentioned in heart rate measurement (page 118).

On completion of the heart rate measurement, the cardiac output (CO) is displayed.

Hints

Toggling between cursors is not possible on pressing *MEASURE*.

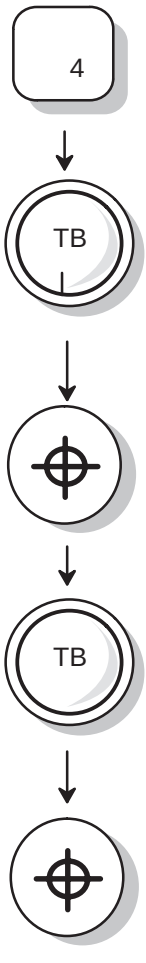
To clear a measurement and apply a second formula, press *CLEAR* repeatedly until the measurements are erased. Then start a new session.

NOTE: To abort a measurement midway press CLEAR. Unfreezing the screen midway clears the previous LV function measurement.

Substitution of a LV measurement

A previous LV measurement like LVIDd, LVIDs or the Heart Rate can be replaced independently without repeating the whole sequence.

Example: After completion of the Cubed formula LV functions it is realised that LVIDs has been erroneously measured.
To replace LVIDs without repeating the whole sequence:



Press [4]. The LVIDs item is highlighted. An open ended "><" cursor with a vertical line appears on the screen.

Use the TRACKBALL *to move the open ended "><" cursor to either end of the starting point of LVIDs dimension.*

Press SET *to fix the start point cursor. A second open ended "><" cursor appears on the vertical line. It is moveable only in the vertical axis.*

Use the TRACKBALL *to move the open ended "><" cursor to the end point of the LVIDs measurement.*

Press SET *to fix the end point cursor. The LVIDs is corrected and the corresponding ESV, SV, EF, and CO are displayed.*

Urology

Urology

This section describes the Urology sonolographic Examination.

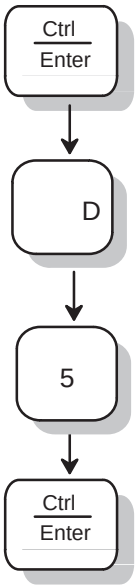
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Urology

Overview

The Urology Diagnostic Category offers:

- Optimization of image quality for kidney, bladder and prostate.
- Measurement menu consisting of general measurement.
- Urology Report Page.
- Automatic storage of last three volume measurement in Urology Report Page.



To select the Urology Diagnostic Category, press CONTROL

Select D

Select 5

Press ENTER

Urology Report Page

The last three volume measurements are automatically incorporated in the report page.
Observations can be entered using alphanumeric keys.
Use the TRACKBALL or SHIFT ←↑↓→ keys to move about the report page.
Use BACK SPACE to delete entries.

To invoke the Urology Report Page, select R.



Ensure that you are not in the comment mode. Also ensure that the Urology Diagnostic Category is selected.

The following Screen appears:

```
  <EXAM DATE 01/10/98>
ID : __________
NAME : ________
REFERRAL : _______________                                  AGE:_____
REFERRED FOR :_____________________________

 MEASUREMENTS
   VOLUME #1 __________ml
   VOLUME #2 __________ml
   VOLUME #3 __________ml


   LESION SITE:                                  BIOPSY

             1                                   YES   NO
             2                                   YES   NO
             3                                   YES   NO
             4                                   YES   NO

   COMMENTS


   REPORTED BY:                                  REPORT DATE
```

Illustration 48. Urology Report Page

Control Keys

Configuration Using Control Keys

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Configuration Using Control Keys

The use of Control Keys to configure various parameters in the LOGIQ™ α100 system is described in this chapter. Configuration settings are usually done during installation.

- **CONTROL A -** Frame Averaging
- **CONTROL B -** Biopsy Zone Display (ON/OFF)
- **CONTROL C -** Home Position for Comment
- **CONTROL D -** Diagnostic Category
- **CONTROL E -** Erasing OB User Table
- **CONTROL F -** Factory Default Settings for Current Probe
- **CONTROL G -** OB User Programmable Table Editor
- **CONTROL H -** Help for Control Keys and Direct Keys
- **CONTROL N -** Biopsy Zone Change
- ***CONTROL Q -** Toggle between B/A Mode and B/M Mode
- **CONTROL R -** Report Page Display
- **CONTROL S1 & 2 -** Setup Menu
- **CONTROL T -** Text/Graphics Display On/Off
- **CONTROL W -** Preset Probe Parameters for Current Category
- **CONTROL Y -** Map Curve Selection

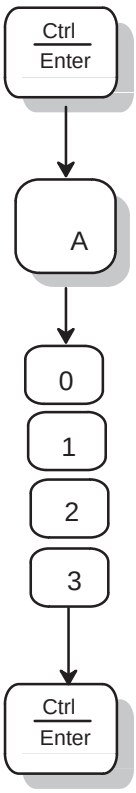


When entering Control sequences, before pressing the *CONTROL/ENTER* key, *BACK SPACE* can be used to erase wrongly entered sequences. If there is no valid sequence, a beep will be heard.

***** Applicable only for systems delivered in India.

Frame Averaging

The **CONTROL A** function accesses frame averaging.



Press *CONTROL*

Press *A* for frame averaging

Press *0* for Frame Averaging Selection Off

Press *1* for Frame Averaging Selection (25%–factory default)

Press *2* for Frame Averaging Selection (50%)

Press *3* for Frame Averaging Selection (75%)

Press *ENTER.* The Frame Averaging selection chosen is active and the Control function is deactivated.

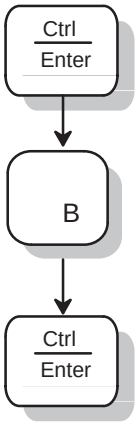
Selection of frame averaging is done on the image which is displayed currently on the screen.

NOTE : CONTROL W can be used to preset Frame Averaging values.

NOTE:CONTROL A1 : 25% old data and 75% new data
CONTROL A2: 50% old data and 50% new data
CONTROL A3: 75% old data and 25% new data

Biopsy Zone Display ON/OFF

The **CONTROL B** function toggles the biopsy lines ON/OFF. Biopsy Lines are displayed as a dotted line on the B-Mode image.



Press *CONTROL*

Press *B* for Biopsy Zone Display

Press *ENTER* to display the Biopsy guidelines on the image. The biopsy zone angle designation is displayed next to the probe name on the left side of the image display.

NOTE: The Biopsy Zone Display can also be selected by directly pressing the alphanumeric key ‘B’. The user should not be in Comment mode when this function is accessed.

For the C36, C55 and L76 probes, the biopsy zone angles are SGL, MBX1, MBX2 and MBX3. The guidelines are changed sequentially by selecting ‘N’.

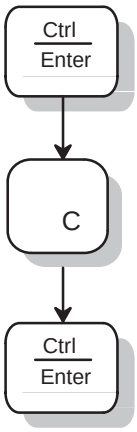
For the E72 probe, the biopsy angle is TV0° or TR5°(user selectable).

The selected biopsy zone angle designation is displayed on the left hand side of the image display.

A message “Confirm BX type of Bracket” appears in reverse video below the image.

Home Position for Comment

Press the *COMMENT* key. When the cursor appears, use the *TRACKBALL* to move the cursor to the desired home position. Press *CONTROL C* to set the home position. When the *COMMENT* key is pressed again, the cursor appears in the home position as set above.



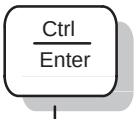
Press *CONTROL*

Press *C* to set the home position for the cursor in the comment mode.

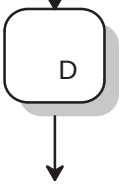
Press *ENTER* to accept the home position for the cursor and exit the Control mode.

Diagnostic Category

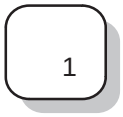
The patient study category can be selected using this option. For details, refer to the Diagnostic Category chapter on page 125.



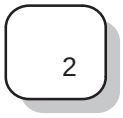
Press *CONTROL*



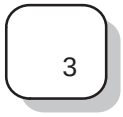
Press *D*.



Press *1* for Abdomen



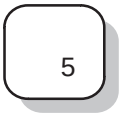
Press *2* for Obstetrics (Factory Default)



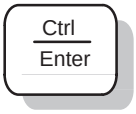
Press *3* for Gynecology



Press *4* for Cardiology



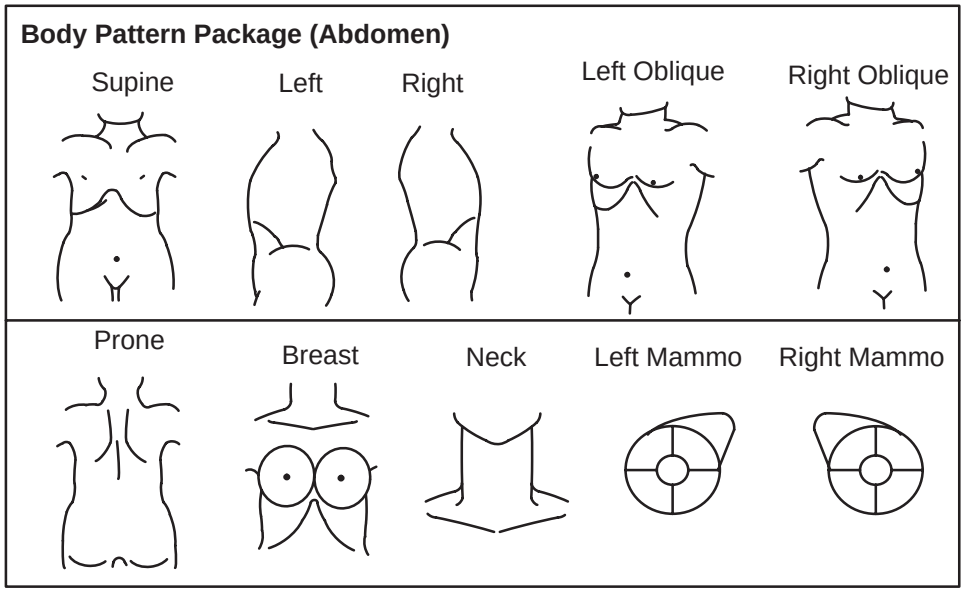
Press *5* for Urology



Press *ENTER*. The selected package becomes active.

All the body patterns are supported irrespective of the diagnostic category.

Body Patterns



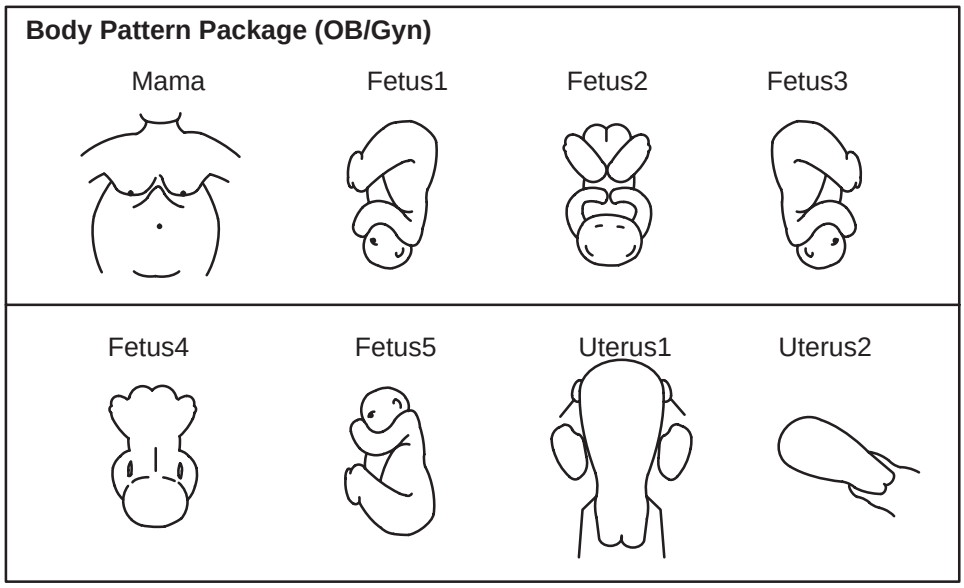
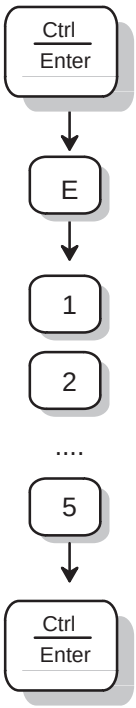


Illustration 49. Body Marker Patterns

A Veterinary Body Package is also present. This is applicable only for Veterinary applications.

Erasing OB User Table

The **CONTROL E** function erases OB user Tables.



To permanently erase a User Table from the system, press *CONTROL*.

Select *E*

Select the desired user table number to erase.

Select *ENTER* to erase that User Table.

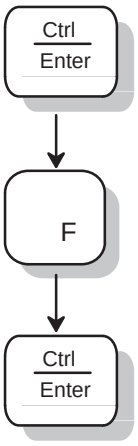
Once cleared the table is available for entering new OB data.

Factory Default Settings

Use the **CONTROL F** function to revert to the Factory Default settings which are preset at the time of shipment for the current probe.

Probe	Depth mm	Gain dB	Focus mm	DR dB	CONT Map	IR	II	Near Gain	Far Gain	Frame Average (Old data)
C36	150	50	60	54	3	Right	Up	0	0	25%
C55	150	50	60	54	3	Right	Up	0	0	25%
E72	75	50	40	54	2	Right	Up	0	0	25%
L76	75	50	30	54	3	Right	Up	0	0	25%
C31	150	50	60	54	3	Right	Up	0	0	25%
VE5	100	50	60	54	3	Right	Up	0	0	25%

Table 17. Factory settings by Probe



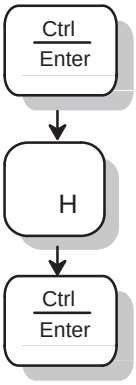
Press *CONTROL*

Press *F* for Factory Default Settings

Press *ENTER.* The settings revert to the Factory Default.

Help for Control and Direct Keys

The **CONTROL H** function enables a Help screen for Control and Direct keys. When the Help screen is enabled, the image display is temporarily not visible, along with measurements, comments and body patterns. Pressing *CLEAR* removes the Help screen from the display while restoring all image display, measurements, comments and body patterns. Press *CLEAR* again to exit the Control mode.



Press *CONTROL*

Press *H* for the Help Screen for Control Keys.

Press *ENTER*. A Help Screen is enabled for the Control and Direct keys. See Illustration 50 on page 246 for an example of the Help Screen.

The Help screen can also be accessed by directly pressing the alphanumeric key ‘H’. The user should not be in the comment mode when this function is accessed.

Help for Control and Direct Keys (cont'd)

HELP MENU FOR CONTROL & DIRECT KEYS

CTRL–An : FRAME AVERAGING (0: OFF 1:25% 2: 50% 3:75%)
CTRL–B : BIOPSY ZONE DISPLAY ON/OFF
CTRL–C : HOME POSITION FOR COMMENT
CTRL– Dn: DIAGNOSTIC CATEGORY SEL (1: ABD, 2:OB, 3:GYN, 4:CARD,5:URO)
(GYN uses OB Body pat., ABD Preset, Map and Calc)
CTRL–En: CLEAR USER OB TABLE (1–5)
CTRL–F : FACTORY DEFAULT SETTINGS FOR CURRENT PROBE
CTRL–Gn : ENTER/EDIT USER OB TABLE (1–5)
CTRL–H : HELP FOR CONTROL&DIRECT KEYS
CTRL–N : BIOPSY ZONE CHANGE
CTRL–R : GESTATIONAL REPORT DISPLAY
CTRL–Sn : SETUP MENU (1: INSTALLATION, 2: EUROPEAN OB TABLE)
CTRL–T : TEXT/GRAPHIC DISPLAY ON/OFF
CTRL–W : PROBE PARAMETER PRESET FOR CURRENT CATEGORY
CTRL–Yn : MAP CURVE SEL (1–5) IN PKG A/B

R : SAME AS CTRL–R
H : SAME AS CTRL–H
B : SAME AS CTRL–B
N : SAME AS CTRL–N
SHIFT–REVERSE : IMAGE INVERT
SHIFT–RECORD : REPORT PRINT ON SERIAL LINE
ROTATE–RIGHT : NEXT PAGE IN GESTATIONAL REPORT
ROTATE–LEFT : PREV PAGE IN GESTATIONAL REPORT

Illustration 50. Help Menu

Biopsy Zone Change

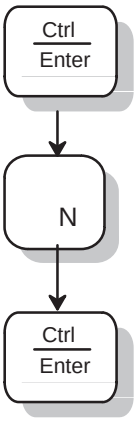
The **CONTROL N** function allows the biopsy zone to be changed for C36 and E72 probes **only**.

*NOTE: Before pressing **CONTROL N** or the alphanumeric key '**N**', the biopsy display should be on (**CONTROL B**). CONTROL N is executable only when the biopsy zone is ON.*

For the C36 probe the biopsy zone angles are BX–3, MBX1, MBX2 and MBX3. The guidelines are changed sequentially each time 'CONTROL–N' is pressed.

For the E72 probe there are two options (TV0°, TR5°).

The selected biopsy zone angle designation is displayed on the left hand side of the image display.



Press *CONTROL*

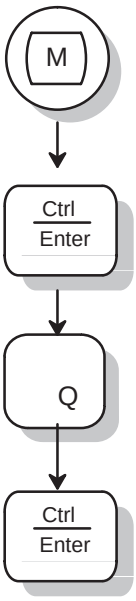
Press *N* to change the Biopsy zone.

Press *ENTER*.

Press CONTROL N *each time to change the zone. The biopsy zone can also be changed by pressing the alphanumeric key 'N'. The user should not be in the Comment mode when this function is accessed.*

*B/A-Mode

The **CONTROL Q** function executed in the B/M mode changes the mode to B/A Mode. The B-Mode image appears on the left side and the A-Mode image appears on the right side.



Press *M* Mode key, it enters the *B/M* Mode Display.

Press *CONTROL*

Press *Q* to enter the B/A mode.

Press *ENTER*.

To exit the B/A *Mode, press* ***CONTROL Q*** *again and it reverts to* B/M *Mode. Press the* B *Mode key to return to the original display.*

***** Applicable only for systems delivered in India.

Report Page Display

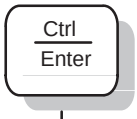
The **CONTROL R** function displays the Report Page.

The report page displayed depends on the Diagnostic Category chosen.

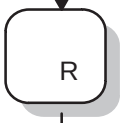
If the Diagnostic category is OB then the OB Report Page is displayed.

It the DIagnostic Category is Urology then the Urology Report Page is displayed.

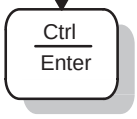
For other Diagnostic Categories the Report Page will not be displayed.



Press *CONTROL*



Press *R* for the Report Page Display



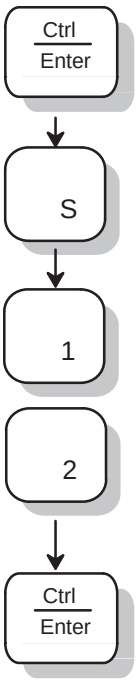
Press *ENTER*

The appropriate Report Page for the OB Version selected (U.S., Tokyo University, Osaka University, European or Australian) or for Urology is displayed. Press the *CONTROL* key a second time to exit the report page.

The Report Page can also be selected by directly pressing the alphanumeric key 'R'. The user should not be in the Comment mode when this function is accessed.

Setup Menu

The **CONTROL–S** function accesses the System Setup for the Installation Setup window or the European OB Table Setup window. When this function is enabled, the image, measurements, body patterns and comments (if any) are temporarily not visible on the screen.



Press *CONTROL*

Press *S* for the Setup Menu.

Press *1* for the Installation Setup Window

Press *2* for the European OB Table Setup Window

Press *ENTER* to display the Installation Setup window or the European OB Table Setup window as illustrated in the following Illustrations.

Setup Menu (cont'd)

INSTALLATION SETUP

1. HOSPITAL NAME: [ ]
2. DATE FORMAT: 1
   1:DD/MM/YY 2:MM/DD/YY 3:YY/MM/DD)
3. DATE: XX/XX/XX 4.TIME: XX:XX
5. OB VERSION SELECTED: 1
   (1:US 2:TOKYO 3:OSAKA 4:EUROPE 5:ASUM)
6. FILM EXPOSURE TIME: 4
   (1:125ms 2:250ms 3:375ms 4:500ms)
7. MINIMUM FILM EXPOSURE INTERVAL : 2 (1–9 seconds)
8. VIDEO INVERT FOR REPORT PRINT : 2 (1:YES2:NO)
9. CIRCUMFERENCE MEASUREMENT METHOD: 1
   (1:ELLIPSE 2:2DISTANCE 3:TRACE)
10. US GA SELECTION : 1(1:CUA 2:AUA)
11. ADD 1 WEEK TO EDD : 1 (1:NO 2:YES)
12. LANGUAGE : 1 (1:ENG 2:GER 3:FRE 4:ITA 5:POR 6:SPA)
13. HIP ORIENTATION:1 (1:CRANIAL LEFT 2:CAUDAL LEFT)

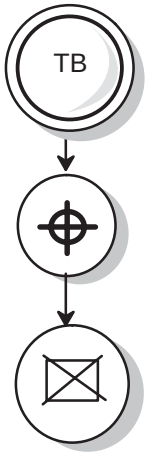
Illustration 51 Installation Setup Menu

EUROPEAN OB TABLE SETUP

Item:	Sel	Option	Author
GS:	9	(0,2,9)	1: JEANTY
CRL:	1	(0,1,2,3,4,6)	2: HANSMANN
BPD:	1	(0,1,2,3,4,5,7)	3: PARIS
HC:	1	(0,1,2,5)	4: CAMPBEL
AC:	1	(0,1,2,5)	5: SOSTOA
FL:	1	(0,1,2,3,4,5)	6: NELSON
BD:	1	(0,1,4,5,8)	7: KURTZ
TAD:	3	(0,2,3)	8. BERKOWITZ
OFD:	5	(0,2,5)	9. TOKYO
Ft:	3	(0,3)	0: N/A
EFW:	1	(1:SHEP/WARS 2:RICH/BERK 3:HADLOCK 4:GERMAN)	

Illustration 52 European Author Selection

Setup Menu (cont'd)



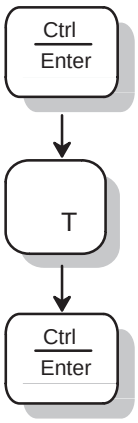
Use the *TRACKBALL* or *SHIFT* ←↑↓→ keys to move from up/down, or left/right to edit the fields. Use *BACK SPACE* to delete a character to the left of the cursor.

Press *SET* to register the inputs and return to the original display. Pressing any other key would result in a beep, indicating it is an error.

Press *CLEAR* to return to the original display without registering any inputs.

Text/Graphic Display On/Off

The **CONTROL T** function toggles the Text/Graphics ON/OFF. The image and the gray scale bar remain.



Press *CONTROL*

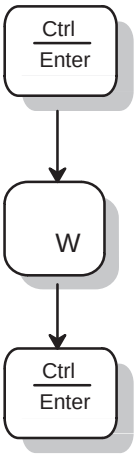
Press *T* for Text/Graphics ON/OFF. It is a toggle key.

Press *ENTER.* The Text/Graphics will not be displayed.

Preset Probe Parameters

Scan Parameters can be preset for each probe in B and B/M-Modes by using **CONTROL W**. Mode Presetting is effective only for the current probe attached to the system. The system reverts to the preset state when *PRESET* is pressed, a probe is changed, or the power is turned on. Parameters that can be preset with this function are:

- Gain
- Dynamic Range
- Focus
- Image Direction, (Right/Left, Top/Bottom)
- Depth
- Gray Scale Map Curve
- Near Gain
- Far Gain
- Frame Averaging Values



To preset Probe parameter, press *CONTROL.*

Press *W* for Preset Probe Parameters. Adjust the various parameters while scanning.

Press *ENTER* to save the values of Gain, Dynamic Range, Focus, Image Reverse, Image Inverse, Depth, Gray Scale Map Curve, Near Gain and Far Gain as preset values.



Hints

If a mistake is made while presetting, revert back to factory default settings by pressing *CONTROL F.*

Map Curve Selection

The system has ten types of curves (in two groups A and B) that translate an image from system memory into a gray scale display. The **CONTROL Y** function selects the gray level mapping curve for a Diagnostic Category or the Category under study.
The OB Diagnostic Category uses package B. All the other Diagnostic Categories use package A. To assign a map curve to an image *(frozen or real time):*



Press *CONTROL*

Press *Y* for the Map Curve Selection

Press *1* for Mapping Level 1

Press *2* for Mapping Level 2

Press *3* for Mapping Level 3

Press *4* for Mapping Level 4

Press *5* for Mapping Level 5

Press *ENTER.* Any one of the 5 Map Curve Selections chosen is active for the category under study.

Gray Scale Map

Choose the default gray scale map for B-Mode.

Choose 1, 2, 3, 4 or 5.

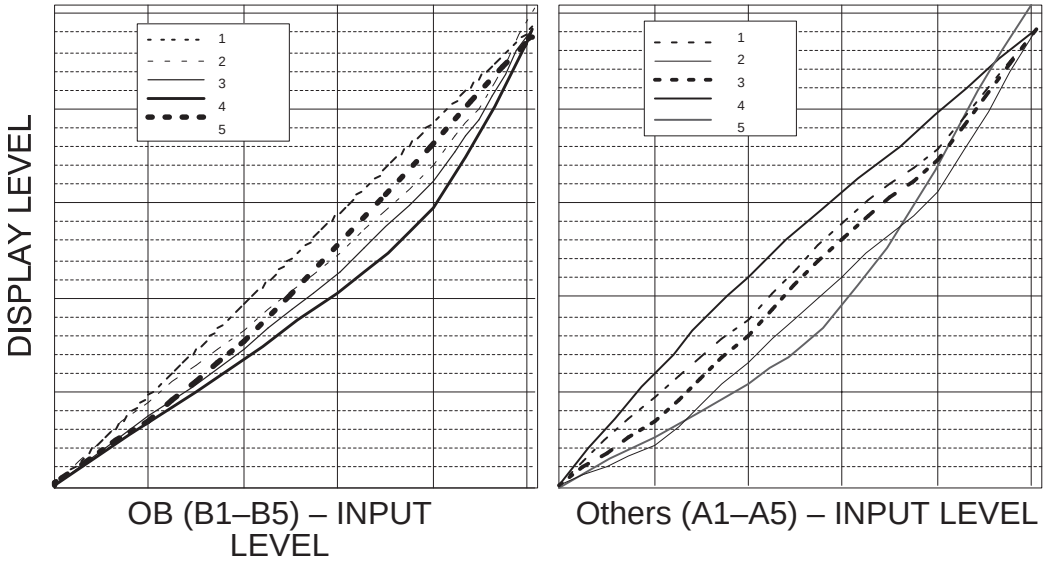


Illustration 53. Gray Scale Map Graphs

Option 1: The picture is transformed into a line on a gray scale. This curve does not enhance image structure.

Option 2: The echo brightness in higher band is increased. The image becomes softer and the surrounding tissues are amplified (ideal for diagnosing soft tissue).

Option 3: The echo brightness in higher band is further increased. The image becomes softer and the surrounding tissues are amplified (ideal for diagnosing soft tissue).

Option 4: The echo brightness in medium band is increased and shows higher contrast. The image will become clearer (used for diagnosing structures with cavities).

Option 5: The echo brightness in medium band is further increased and shows higher contrast.

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Probes/Biopsy

Probes

Biopsy Procedures

This section provides a basic description of the different kinds of Probes and explains Biopsy procedures.

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Probes

Kinds of Probes

Probe Type	Catalog No.	Frequency in MHz	Radius of Curvature	FOV
C36 – Convex	H45252CF	3.5	50mm	68°
C55 – Convex	H45252CE	5.0	40mm	68°
E72 – Micro Convex	H45252MT	6.5	10mm	114°
L76 – Linear	H45252HP	7.5	–	60mm
C31 – Convex	2175994	3.5	13.1mm	85°
VE5 – Linear	TLS355RV	5.0	–	60mm

Table 18. Probe Data

Usage of the Probes

Always select a probe that provides optimum focal depth and penetration for patient size and application. Proper orientation of the probes produce best results.

The **Linear probe (L76)** is a high frequency probe used for imaging small parts and superficial structures.

The **Convex probe (C36, C55, C31)** is used for OB/GYN, abdomen and cardiology scans.

The **Micro Convex probe (E72)** is the intracavitary probe used for early pregnancy, follicular studies and urology applications.

The **Linear probe (VE5)** is used in veterinary applications.

Depth Details

Probe and Image Depth					
C36	C55	E72	L76	C31	VE5
200mm	200mm	150mm	150mm	200mm	150mm
150mm	150mm	100mm	100mm	150mm	100mm
100mm	100mm	75mm	75mm	100mm	75mm
75mm	75mm	50mm	50mm	75mm	50mm

Table 19. Probe Depth Data

Care and Maintenance

Inspecting probes



After Each Use

Inspect the probe's lens, cable, and casing after each use. Look for any damage that would allow liquid to enter the probe. If any damage is found, do not use the probe until it has been inspected and repaired/replaced by a GE Service Representative.

Keep a log of all probe maintenance, along with a picture of any probe malfunction.

Storing probes

After scanning and cleaning of the probe is completed, put the probe in its carrying case to ensure safe storage.

Transporting probes

Secure the probe in its holder for moving short distances. When transporting a probe for a long distance store it in its carrying case.

Environmental Requirements

Probes should be operated, stored or transported within the parameters outlined below.

	Operational	Storage	Transport
Temperature	10° to 40° C 50°to 104° F	–10°to 60° C 14°to140° F	–40°to 60° C –40°to 140° F
Humidity	30 to 75% non-condensing	30 to 90% non-condensing	30 to 90% non-condensing
Pressure	700 to 1060hPA	700 to 1060hPA	700 to 1060hPA

Table 20. Probe Environmental Requirements

Probe Safety

Handling precautions

WARNING 

Ultrasound probes are highly sensitive medical instruments that can easily be damaged by improper handling. Use care when handling and protect from damage when not in use. **DO NOT** use a damaged or defective probe. Failure to follow these precautions can result in serious injury and equipment damage.

Electrical shock hazard



Electrical Hazard

The probe is driven with electrical energy that can injure the patient or user if live internal parts are contacted by conductive solution:

- **DO NOT** immerse the probe into any liquid beyond the level indicated by the immersion level diagram. Never immerse the probe connector or probe adaptors into any liquid.
- **DO NOT** drop the probes or subject them to other types of mechanical shock or impact. Degraded performance or damage such as cracks or chips in the housing may result.
- Inspect the probe before and after each use for damage or degradation to the housing, strain relief, lens, and seal. A thorough inspection should be conducted during the cleaning process.
- **DO NOT** kink, tightly coil, or apply excessive force on the probe cable. Insulation failure may result.
- Electrical leakage checks should be performed on a routine basis by GE Service or qualified hospital personnel. Refer to the service manual for leakage check procedures.

Mechanical hazards

CAUTION 

A defective probe or excessive force can cause patient injury or probe damage:

- Observe depth markings and do not apply excessive force when inserting or manipulating intracavitary probes.
- Inspect probes for sharp edges or rough surfaces that could injure sensitive tissue.

Special handling instructions

Using protective sheaths

CAUTION 



Biological Hazard

Protective barriers may be required to minimize disease transmission. Probe sheaths are available for use with all clinical situations where infection is a concern. Sterile sheaths should be used when sterile clinical procedures are indicated.

Instructions. Custom made sheaths are available for each probe. Each probe sheath kit consists of a flexible sheath used to cover the probe and cable and elastic bands used to secure the sheath.

CAUTION 

Devices containing latex may cause severe allergic reaction in latex sensitive individuals. Refer to FDA's March 29, 1991 Medical Alert on latex products.

Probe handling and infection control

This information is intended to increase user awareness of the risks of disease transmission associated with using this equipment and provide guidance in making decisions directly affecting the safety of the patient as well as the equipment user.

Diagnostic ultrasound systems utilize ultrasound energy that must be coupled to the patient by direct physical contact. Depending on the type of examination, this contact occurs with a variety of tissues ranging from intact skin in a routine exam to recirculating blood in a surgical procedure. The level of risk of infection varies greatly with the type of contact.

One of the most effective ways to prevent transmission between patients is with single use or disposable devices. However, ultrasound transducers are complex and expensive devices that must be reused between patients. It is very important, therefore, to minimize the risk of disease transmission by using barriers and through proper processing between patients.

CAUTION 

Adequate cleaning and disinfection are necessary to prevent disease transmission. It is the responsibility of the equipment user to verify and maintain the effectiveness of the infection control procedures in use. Always use probe sheaths for intracavitary procedures.

Probe Cleaning Process



After Each Use

To clean the probe:

1. After each use, disconnect the probe from the ultrasound console and remove all coupling gel from the probe by wiping with a soft cloth and rinsing with flowing water.
2. Wash the probe with mild soap in lukewarm water. Scrub the probe as needed using a soft sponge, gauze, or cloth to remove all visible residue from the probe surface. Prolonged soaking or scrubbing with a soft bristle brush (such as a toothbrush) may be necessary if material has dried onto the probe surface.

Probe Cleaning Process (cont'd)

3. Rinse the probe with enough clean potable water to remove all visible soap residue.
4. Air dry or dry with a soft cloth.

Special Cleaning Instructions for the E72: When cleaning the E72 probe, it is important to be sure that all surfaces are thoroughly cleaned. This probe has an adjustable two-part handle that must be disassembled to gain access to all surfaces. To disassemble the handle, completely remove the handle adjustment screw located mid-way between the cable entry and probe tip the two handle halves and adjustment screw must be thoroughly cleaned along with the main probe shaft as described earlier in step 2. After rinsing and drying is completed, the probe handle can be loosely reassembled for the disinfection process.

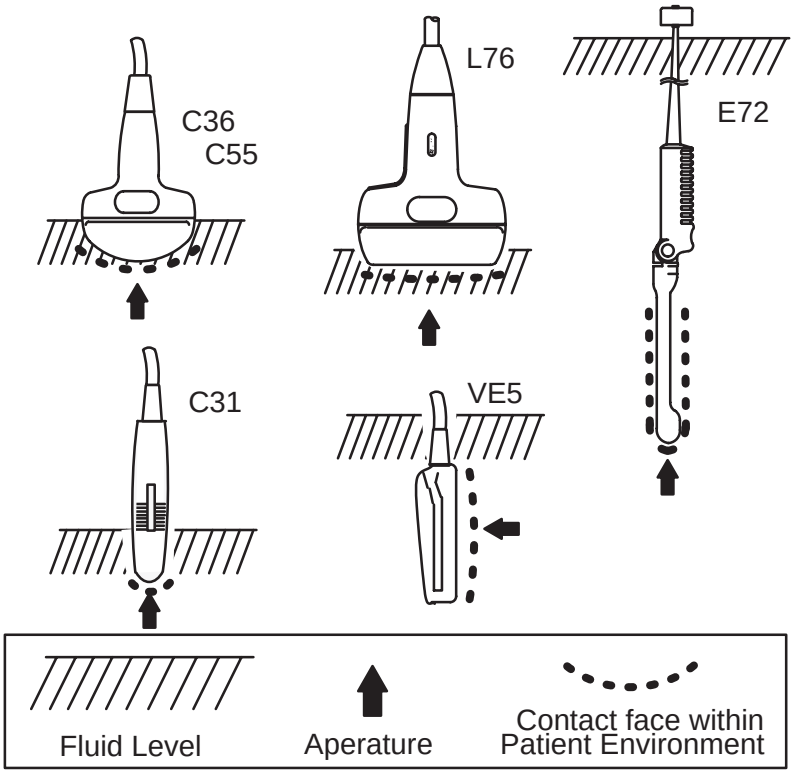


Illustration 54. Probe Immersion Levels

Disinfecting probes



After Each Use

Ultrasound probes can be disinfected using liquid chemical germicides. The level of disinfection is directly related to the duration of contact with the germicide. Increased contact time produces a higher level of disinfection. 2% Glutaraldehyde-based solutions have been shown to be very effective for this purpose. Cidex is the only germicide that has been evaluated compatibility with the material use to construct the probes.

CAUTION 

In order for liquid chemical germicides to be effective, all visible residue must be removed during the cleaning process. Thoroughly clean the probe, as described earlier, before attempting disinfection.

1. Prepare the germicide solution according to the manufacturer's instructions. Be sure to follow all precautions for storage, use and disposal.
2. Place the cleaned and dried probe surface in contact with the germicide solution. High-level disinfection (for surface and cavity probes) can be accomplished by soaking according to the contact time recommended by the germicide manufacturer.
3. After removing from the germicide, rinse the probe following the germicide manufacturer's rinsing instructions. Flush germicide residue from the probe and allow to air dry.

Disinfecting probes (cont'd)

Special Disinfecting Instructions for the E72: To properly disinfect the E72 probe, the probe handle can be reassembled loosely so that the entire probe with handle can be immersed in the germicide solution. The adjustment screw must be kept loose so that germicide can penetrate to all surfaces. After immersing, rotate and shake the probe while it is below the surface of the germicide to eliminate air pockets. Allow the germicide to remain in contact with the fully immersed probe, for high level disinfection, according to the germicide manufacturer's recommended time. To remove all germicide residue, final rinsing should be done following the germicide manufacturer's instructions. Remove excess water by shaking and allow to air dry.

WARNING Ultrasound transducers can easily be damaged by improper handling and by contact with certain chemicals. Failure to follow these precautions can result in serious injury and equipment damage.

- Do not immerse the probe into any liquid beyond the level specified for that probe. Never immerse the transducer connector or probe adapters into any liquid.
- Avoid mechanical shock or impact to the transducer and do not apply excessive bending or pulling force to the cable.
- Transducer damage can result from contact with inappropriate coupling or cleaning agents:
- Do not soak or saturate transducers with solutions containing alcohol, bleach, ammonium chloride compounds or hydrogen peroxide
    - Avoid contact with solutions or coupling gels containing mineral oil or lanolin
    - Avoid temperatures above 60° C.
- Inspect the probe prior to use for damage or degeneration to the housing, strain relief, lens and seal. Do not use a damaged or defective probe.

Coupling gels

Applying

In order to assure optimal transmission of energy between the patient and probe, a conductive gel or couplant must be applied liberally to the patient where scanning will be performed.

Precautions

Coupling gels should not contain the following ingredients as they are known to cause probe damage:

- Methanol, ethanol, isopropanol, or any other alcohol-based product
- Mineral oil
- Iodine
- Lotions
- Lanolin
- Aloe Vera
- Methyl or Ethyl Parabens (para hydroxybenzoic acid)

Planned Maintenance

CAUTION 

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.

Do the Following	Daily	After Each Use	As Necessary
Inspect the Probes	**X**		
Clean the Probes		**X**	
Disinfect Probes		**X**	

Table 21. Planned Maintenance Program

Acoustic Output

Control Parameters which Affect Acoustic Sound

The transmit acoustic power and intensity output of the imaging system is related to various control settings which can be changed during the course of an exam. The operator should be aware of which controls affect output so as to obtain the optimal image, while at the same time exposing the patient to only minimum ultrasound energy.

The following parameters can affect acoustic output.

Focus

Changing the focus to optimize the image over a particular region of the scan changes the depth at which the maximum intensities may occur. Typically, the region of maximum intensity is close to the focal distance. Values reported represent the maximum intensity at one particular focal depth. All other focus depths result in lower values.

M-Mode

Placing the machine into M-Mode affects the acoustic output of the system. In M-Mode, repetitive pulse firings occur on the same scan line (corresponding to the M-Mode vector displayed) which increased the time–average of SPTA intensity along the scan line chosen.

The SPTA intensity is typically increased by a factor of 30 to 60 times over that in B-Mode. In almost all cases, the total output power and the pulse average intensities (i.e., SPPA or I–m) are not affected, even along the scan line chosen.

B/M-Mode

In this combination mode, both B- and M-Mode vectors are generated by the machine. The SPTA intensity will be increased along the M-Mode line selected, but typically not to the extent as when M–Mode alone is selected. As with M-Mode, the SPPA, I–m and total power remain unchanged.

The SPPA and I–m intensities remain relatively constant, regardless of mode selected. The SPPA intensity is strongly affected by mode selection, as a result of more pulses being directed at the specific site selected. The SPTA intensity is increased in M-Mode over B-Mode.

Acoustic Level Notes

1. System Acoustic Power Control set at 100%, with system parameters adjusted to maximize individual intensities.
2. Intensities and focal areas measured in water at locations which correspond to maximized normalized (in–situ) intensities.
3. The water values can be converted to normalized (in–situ) values by using the following formula:

   $I_t = I_w e^{-0.23a'fz}$ where:
   I_t = in–situ intensity
   a'= tissue attenuation (0.3dB/MHz/cm)
   I_w = measured water intensity
   f = Ultrasonic center frequency (MHz)
   e = appx.2.7183
   z = ultrasound path length (one–way) (cm)
4. In–situ intensity values remain below FDA specified pre–enactment values for applicable clinic applications for all control settings.
5. 20dB Beam Area represents the 20dB two–way beam area of a single vector measured at the depth of maximum SPTA intensity.
6. Beam Entrance Area represents the area of the surface of the transducer emitting one acoustic window. For sector scanners, this is also the active acoustic area in contact with the patient.

Measurement Basis for Probe Output

Acoustic Power (milliwatts)

Probe acoustic power output is determined by measuring the force exerted on an absorbing target by the acoustic radiation field with a force microbalance.

Acoustic Intensity (milliwatts/cm^2 or watts/cm^2)

Probe acoustic intensity levels are determined using a calibrated (milliwatts/cm^2) PVDF miniature hydrophone.

Acoustic intensities presented in this manual are below FDA specified limits for the indicated clinical applications and will not be exceeded for any system control setting combinations. The user should be familiar with equipment controls that affect acoustic output levels.

Acoustic Output Tables

Probe: C36

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	z_{sp} (cm)	$X_{-6}Y_{-6}$ (mm x mm)	PD (µs)	PRF (KHz)	EDS (mm x mm)
I_{SPTA-3}	0.4 mW	5.5	3.21					1.0 x 1.26
I_{SPPA-3}	5.4W		3.21	4.973	3.15 x 4.22	0.387	3.1	

Table 22. Mode: B–Mode, Applications: OB/GYN, Abdominal

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	z_{sp} (cm)	$X_{-6}Y_{-6}$ (cm)	PD (µs)	PRF (KHz)	EBD (mm x mm)
I_{SPTA-3}	0.6mW	0.99	3.1	4.97	3.02x3.21			1.0x1.26
I_{SPPA-3}	11.7W		3.1	4.97	3.02x3.21	0.379	3.1	

Table 23. Mode: M–Mode, Applications: OB/GYN, Abdominal

Probe: C55

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	Z_{sp} (cm)	$X_{-6}Y_{-6}$ (mm x mm)	PD (µs)	PRF (KHz)	EDS (mm x mm)
I_{SPTA-3}	0.2 mW	5.506	4.1					1.12x1.16
I_{SPPA-3}	10.3W		4.4	4.16	2.22x4.74	0.298	3.1	

Table 24. Mode: B–Mode, Applications: OB/GYN, Abdominal

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	Z_{sp} (cm)	$X_{-6}Y_{-6}$ (cm)	PD (µs)	PRF (KHz)	EBD (mm x mm)
I_{SPTA-3}	1.0mW	1.137	4.0	4.16	2.39x3.42			1.12x1.16
I_{SPPA-3}	24.2W		4.0	4.16	2.39x3.42	0.317	3.1	

Table 25. Mode: M–Mode, Applications: OB/GYN, Abdominal

Probe: L76

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	Z_{sp} (cm)	$X_{-6}Y_{-6}$ (mm x mm)	PD (µs)	PRF (KHz)	EDS (mm x mm)
I_{SPTA-3}	0.4mW	3.6	4.6					1.0x0.86
I_{SPPA-3}	16.7W		4.6	3.0	1.62x3.17	0.244	3.1	

Table 26. Mode: B–Mode, Applications: General OB, Abdominal

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	Z_{sp} (cm)	$X_{-6}Y_{-6}$ (cm)	PD (µs)	PRF (KHz)	EBD (mm x mm)
I_{SPTA-3}	1.2mW	0.47	4.6	3.0	1.58x2.59			1.0x0.86
I_{SPPA-3}	32.8W		4.6	3.0	1.58x2.59	0.277	3.1	

Table 27. Mode: M–Mode, Applications: General OB, Abdominal

Probe: E72

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	z_{sp} (cm)	$X_{-6}Y_{-6}$ (mm x mm)	PD (μs)	PRF (KHz)	EDS (mm x mm)
I_{SPTA-3}	0.05mW	1.386	4.88					0.465x0.9
I_{SPPA-3}	2.5		4.88	1.8	3.28x9.04	0.172	3.1	

Table 28. Mode: B–Mode, Applications: Intracavitary

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	z_{sp} (cm)	$X_{-6}Y_{-6}$ (cm)	PD (μs)	PRF (KHz)	EBD (mm x mm)
I_{SPTA-3}	0.2mW	0.787	4.89	1.8198	2.6x5.66			0.465x0.9
I_{SPPA-3}	6.2W		4.89	1.8198	2.6x5.66	0.236	3.1	

Table 29. Mode: M–Mode, Applications: Intracavitary

Probe: C31

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	z_{sp} (cm)	$X_{-6}Y_{-6}$ (mm x mm)	PD (μs)	PRF (KHz)	EDS (mm x mm)
I_{SPTA-3}	27mW	1.457	3.31	4	0.27,0.41			0.94
I_{SPPA-3}	17.59W		3.31	4	0.27,0.41	0.416	3.94	

Table 30. Mode: B–Mode, Applications: Cardiology

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	z_{sp} (cm)	$X_{-6}Y_{-6}$ (cm)	PD (μs)	PRF (KHz)	EBD (mm x mm)
I_{SPTA-3}	1.13mW	1.457	3.31					0.94
I_{SPPA-3}	17.59W		3.31	4	0.27,0.41	0.41	3.94	

Table 31. Mode: M–Mode, Applications: Cardiology

Probe VE5

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	Z_{sp} (cm)	$X_{-6}Y_{-6}$ (mm x mm)	PD (µs)	PRF (KHz)	EDS (mm x mm)
I_{SPTA-3}	71.9mW	1.409	4.76	4	0.22,0.13			1.25
I_{SPPA-3}	104.8W		4.76	4	0.22,0.13	0.186	3.94	

Table 32. Mode: B–Mode, Applications: Cardilogy

	Max Value (per cm^2)	W_0 (mW)	F_C (MHz)	Z_{sp} (cm)	$X_{-6}Y_{-6}$ (cm)	PD (µs)	PRF (KHz)	EBD (mm x mm)
I_{SPTA-3}	1.5mW	1.409	4.76					1.25
I_{SPPA-3}	104.8W		4.76	4	0.22,0.13	0.186	3.94	

Table 33. Mode: M–Mode, Applications: Cardiology

Symbol Description

Symbol	Description
I_{SPTA-3}	Is the derated spatial–peak, temporal–average intensity (milliwatts per cm^2)
I_{SPPA-3}	Is the derated spatial–peak, pulse average intensity (watts per cm^2)
W_0	Is the ultrasonic power (milliwatts)
f_c	Is the center frequency (megahertz)
Z_{SP}	Is the axial distance used to calculate the derated intensity (cm)
Y_{-6}	Is respectively the in–plane (azimuthal) and out of plane (elevational) –6dB dimensions in the x–y plane where Z_{SP} is found (cm)
PD	Is the pulse duration (micro–seconds)
PRF	Is the pulse repetition frequency (hertz)
EDB	Are the entrance beam dimensions for the azimuthal and elevational planes (cm)
EDS	Are the entrance dimensions of the scan for the azimuthal and elevational planes (cm)

IEC Acoustic Output Tables

Acoustical parameters represent the maximum values for a probe/mode combination; other parameters refer to the operating conditions which yield these maximum acoustic parameters.

Key to Tables

Parameter	Unit	Description
P_-	(MPa)	Peak-negative acoustic pressure in the plane perpendicular to the beam-alignment axis containing the maximum pulse-pressure-squared integral (or maximum mean square acoustic pressure for continuous wave systems) in the whole ultrasonic field.
I_{spta}	mW/cm^2	Spatial-peak temporal-average derived intensity in the whole ultrasonic field.
I_p	mm	Distance from the transducer output face to the point of maximum pulse-pressure-squared integral (or maximum mean square acoustic pressure for continuous wave systems).
W_{pb6} (||) ($\perp$)	mm	–6 dB pulse beam-width at the point of maximum pulse-pressure-squared integral (or maximum mean square acoustic pressure for continuous wave systems). These directions shall be parallel (||) and perpendicular ($\perp$) to the reference direction.
prr	KHz	Pulse repetition rate for non-scanning modes.
srr	Hz	Scan repetition rate (srr) for scanning modes.
Output Beam Dimensions	mm	Dimensions parallel and perpendicular to the reference direction.
f_{awf}	MHz	Arithmetic-mean acoustic-working frequency measured by a hydrophone placed at the point of maximum pulse-pressure-squared integral (or maximum mean square acoustic pressure for continuous wave systems).
APF	%	Acoustic power-up fraction.
AIF	%	Acoustic initialization fraction.

Table 34. Key to IEC Table Value

Key to Tables (cont'd)

Parameter	Unit	Description
Maximum Power	mW	Maximum temporal-average power output. For scanning modes, this shall be the total power output of all the acoustic pulses.
I_{ob}	mW/cm^2	Output beam intensity.
Power-up Mode		In systems in which the user defines the power-up mode, this shall be stated as either "user defined" or "not applicable" (n/a).
Initialization Mode		In systems in which the user defines the initialization mode, this shall be stated as either "user defined" or "not applicable" (n/a).
Acoustic Output Freeze		If the system has acoustic output freeze, then this shall be stated as "yes;" otherwise, it shall be stated as "no."
I_{tt}	mm	Transducer to transducer-output-face distance.
I_{ts}	mm	Typical value for the transducer stand-off distance. If the transducer assembly is normally used in contact with the patient, then this shall be specified "contact" system.

Table 34. Key to IEC Table Value (cont'd)

Probe: C36

Parameter	B-Mode	M-Mode
P(MPa)	0.85	0.93
I_{SPTA} (mW/cm$^{2)}$	0.4	0.6
I_p (mm)	49.7	49.7
W_{pb6} (‖) (mm) (⊥)(mm)	3.15 4.22	3.02 3.21
P_{rr} (KHz)	–	3.1
S_{rr} (Hz)	20	–
Output Beam Dimensions(‖) mm (⊥) mm	10.0 12.6	10.0 12.6
f_{afw} (MHz)	3.21	3.1
APF (%) Acoustic Power up Fraction	NA	NA
AIF (%) Acoustic Initialization) Fraction	NA	NA
Maximum Power (mW)	5.5	0.9
I_{ob} (mW/cm^2)	4.0	0.7
Power–up Mode	NA	NA
Initialization Mode	NA	NA
Acoustic Output Freeze	NA	NA
I_u (mm)	0.00	0.00
I_{ts} (mm)	Contact	Contact

Table 35. C36 IEC Acoustic Output Information

Probe: C55

Parameter	B-Mode	M-Mode
P(MPa)	1.19	1.26
I_{SPTA} (mW/cm$^{2)}$	0.2	1.0
I_p (mm)	41.6	41.6
W_{pb6} (‖) (mm) (⊥)(mm)	2.27 4.74	2.35 3.42
P_{rr} (KHz)	–	3.1
S_{rr} (Hz)	20	–
Output Beam Dimensions(‖) mm (⊥) mm	11.2 11.6	11.2 11.6
f_{afw} (MHz)	4.4	4.0
APF (%) Acoustic Power up Fraction	NA	NA
AIF (%) Acoustic Initialization) Fraction	NA	NA
Maximum Power (mW)	5.5	1.14
I_{ob} (mW/cm^2)	4.0	0.8
Power–up Mode	NA	NA
Initialization Mode	NA	NA
Acoustic Output Freeze	NA	NA
I_u (mm)	0.00	0.00
I_{ts} (mm)	Contact	Contact

Table 36. C55 IEC Acoustic Output Information

Probe: L76

Parameter	B-Mode	M-Mode
P(MPa)	1.44	1.53
I_{SPTA} (mW/cm$^{2)}$	0.4	1.2
I_p (mm)	30	30
W_{pb6} (‖) (mm) (⊥)(mm)	1.62 3.17	1.58 2.59
P_{rr} (KHz)	–	3.1
S_{rr} (Hz)	20	–
Output Beam Dimensions(‖) mm (⊥) mm	10 8.6	10.0 8.6
f_{afw} (MHz)	4.6	4.6
APF (%) Acoustic Power up Fraction	NA	NA
AIF (%) Acoustic Initialization) Fraction	NA	NA
Maximum Power (mW)	3.6	0.47
I_{ob} (mW/cm^2)	4.0	0.5
Power–up Mode	NA	NA
Initialization Mode	NA	NA
Acoustic Output Freeze	NA	NA
I_u (mm)	0.00	0.00
I_{ts} (mm)	Contact	Contact

Table 37. L76 IEC Acoustic Output Information

Probe: E72

Parameter	B-Mode	M-Mode
P(MPa)	0.47	0.57
I_{SPTA} (mW/cm$^{2)}$	0.05	0.2
I_p (mm)	18	18.2
W_{pb6} (‖) (mm) (⊥)(mm)	3.28 9.04	2.6 5.66
P_{rr} (KHz)	–	3.1
S_{rr} (Hz)	20	–
Output Beam Dimensions(‖) mm (⊥) mm	4.65 9.0	4.65 9.0
f_{afw} (MHz)	4.88	4.89
APF (%) Acoustic Power up Fraction	NA	NA
AIF (%) Acoustic Initialization) Fraction	NA	NA
Maximum Power (mW)	1.38	0.78
I_{ob} (mW/cm^2)	3.0	2.0
Power–up Mode	NA	NA
Initialization Mode	NA	NA
Acoustic Output Freeze	NA	NA
I_u (mm)	0.00	0.00
I_{ts} (mm)	Contact	Contact

Table 38. E72 IEC Acoustic Output Information

Probe: C31

Parameter	B-Mode	M-Mode	B/M-Mode
P(MPa)	1.35	1.35	1.35
I_{SPTA} (mW/cm$^{2)}$	3.3	78.5	80.7
I_p (mm)	40.0	40.0	40.0
W_{pb6} (‖) (mm) (⊥)(mm)	2.7 4.1	2.7 4.1	2.7 4.1
P_{rr} (KHz)	–	3.94	3.94
S_{rr} (Hz)	30	–	30
Output Beam Dimensions(‖) mm (⊥) mm	12 7.8	12 7.8	12 7.8
f_{afw} (MHz)	3.31	3.31	3.31
APF (%) Acoustic Power up Fraction	NA	NA	NA
AIF (%) Acoustic Initialization) Fraction	NA	NA	NA
Maximum Power (mW)	3.02	3.02	5.03
I_{ob} (mW/cm^2)	3.22	3.22	5.37
Power–up Mode	NA	NA	NA
Initialization Mode	NA	NA	NA
Acoustic Output Freeze	yes	yes	yes
I_u (mm)	0.00	0.00	0.00
I_{ts} (mm)	Contact	Contact	Contact

Table 39. C31 IEC Acoustic Output Information

Probe: VE5

Parameter	B-Mode	M-Mode	B/M-Mode
P(MPa)	1.25	1.25	1.25
I_{SPTA} (mW/cm$^{2)}$	5.3	355.8	359.3
I_p (mm)	40.0	40.0	40.0
W_{pb6} (‖) (mm) (⊥)(mm)	2.2 1.3	2.2 1.3	2.2 1.3
P_{rr} (KHz)	–	3.94	3.94
S_{rr} (Hz)	30	–	30
Output Beam Dimensions(‖) mm (⊥) mm	9 13.9	9 13.9	9 13.9
f_{afw} (MHz)	4.76	4.76	4.76
APF (%) Acoustic Power up Fraction	NA	NA	NA
AIF (%) Acoustic Initialization) Fraction	NA	NA	NA
Maximum Power (mW)	2.32	2.32	3.87
I_{ob} (mW/cm^2)	1.86	1.86	1.86
Power–up Mode	NA	NA	NA
Initialization Mode	NA	NA	NA
Acoustic Output Freeze	yes	yes	yes
I_u (mm)	0.00	0.00	0.00
I_{ts} (mm)	Contact	Contact	Contact

Table 40. VE5 IEC Acoustic Output Information

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Biopsy Procedures

Special Concerns

Precautions Concerning the Use of Biopsy Procedures

WARNING  Do not freeze the image during a biopsy procedure. The image must be live to avoid a positioning error.

Biopsy guidelines are intended to assist the user in determining optimal probe placement and to approximate the needle path. However, actual needle movement can deviate from the guideline. Always monitor the relative positions of the biopsy needle and the subject mass during the procedure.

CAUTION  The use of biopsy devices and accessories that have not been evaluated for use with this equipment may not be compatible and could result in injury.

CAUTION  The invasive nature of biopsy procedures requires proper preparation and technique to control infection and disease transmission. Equipment must be cleaned as appropriate for the procedure prior to use.

- Follow the probe cleaning and disinfection procedures and precautions to properly prepare the probe.
- Follow the manufacturer's instructions for the cleaning of biopsy devices and accessories.
- Use protective barriers, such as gloves and probe sheaths.
- After use, follow proper procedures for decontamination, cleaning, and waste disposal.

Improper cleaning methods and the use of certain cleaning and disinfecting agents can cause damage to the plastic components that will degrade imaging performance or increase the risk of electric shock.

Accessories and Supplies

Required supplies

The following supplies are typically used for a biopsy procedure:

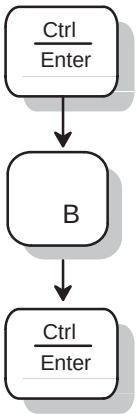
- Pre-packaged biopsy procedure kit with hospital approved instrumentation.
- The probe to be used for the biopsy needle guidance.
- The mounting bracket, needle guides, and sterile probe sheath kits for the specific probe to be used.

Biopsy Procedure

A typical biopsy examination might proceed as follows:

- Ensure that all supplies for the biopsy procedure are on hand before beginning the imaging session.
- Prepare the patient for the biopsy procedure according to accepted practices at your facility.
- Explain the biopsy procedure to the patient, along with any other instructions.
- Prepare the probe, biopsy guide and probe sheath.
- Follow the basic B-Mode scan procedures outlined in *Scan Procedures* to locate the anatomical site to be biopsied.

Displaying Biopsy Guidelines



Activate Biopsy Guide Lines by pressing *CONTROL B* or the alphanumeric key ‘B’ (user should not be in Comment Mode when this function is accessed).

Biopsy guidelines as shown in Illustration 55 gets displayed on the screen.The selected biopsy zone angle designation is displayed on the left hand side of the image display.

NOTE: A message “Confirm BX type of Bracket” appears in reverse video below the image.

The Biopsy Guidelines adjust with image adjustments, such as image inversion/rotations, zoom and depth changes.

Displaying Biopsy Guidelines (cont'd)

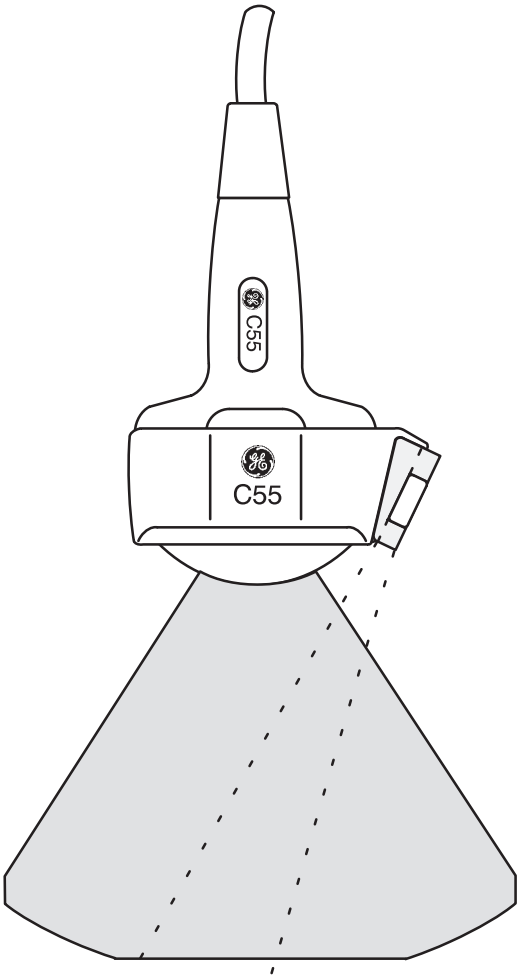
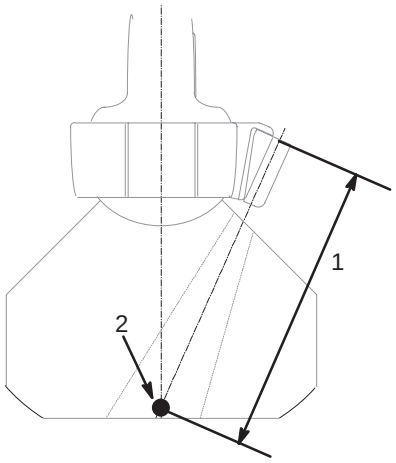


Illustration 55. Biopsy Guidelines

Biopsy Procedure (cont'd)

*NOTE: Press the **MEASUREMENT** key once while the guidelines are present to display the integrated biopsy depth cursor and center line. Use the **TRACKBALL** to measure the needle length. Needle length is from the top of needle barrel to the target.*



1	Needle Length
2	Target

Illustration 56

CAUTION

The needle may vary from the center line or guidezone for various reasons:

- Needle barrel to needle clearance or strength.
- Bracket manufacturing tolerance.
- Needle deflection due to tissue resistance.
- Needle size chosen. Thinner needles may deflect more.
- Wrong needle guide type selection (using Ctrl N key).

The display should be carefully monitored during a biopsy for any needle deviation from the center line or guidezone.

NOTE: The acceptable needle deviation is between 2 mm and 4 mm. If the deviation is greater than this, call Service.

Needle Guide Type Preset

Activate the biopsy guidelines on the system through *CONTROL B as* explained earlier. Press *CONTROL N* or the alphanumeric key 'N' (user should not be in Comment mode) to choose the type of biopsy guide angle (guide zone) display to conform with desired target depth/location. Selection for respective probes is available from the chart below.

	Depth in cm at Center Channel			
	Fixed Angle	Multi–Angle		
Probe	SGL	MBX–1	MBX–2	MBX–3
C36	8.0	4.0	6.0	8.0
C55	7.0	4.0	5.5	7.0
L76	2.0	2.0	4.0	7.0
C31	6.0	n/a	n/a	n/a
VE5	n/a	n/a	n/a	n/a

Table 41. Biopsy Guide Attachment Selection

	Depth in cm at Center Channel	
	Multi–Angle	
Probe	TV0˚	TR5˚
E72	10.0	13.3

Table 42. Biopsy Guide Attachment Selection

DANGER



Failure to match the preset to the guide may cause the needle to track a path outside the displayed lines.

It is extremely important that when using the adjustable angle biopsy guides, the preset displayed on the screen matches the angle set on the guide, otherwise the needle will not follow the displayed guide zone which could result in repeated biopsies or patient injury.

E72 Type Selection

When the E72 probe is attached and active, the needle guide type selection choices can be done using control keys as described in Control Keys section. The following are the angles which can be selected for E72 probe.

- TV0° Reusable metal guide with a 0 degree offset angle.
- TR5° Civco disposable guide with a 5 degree offset angle.

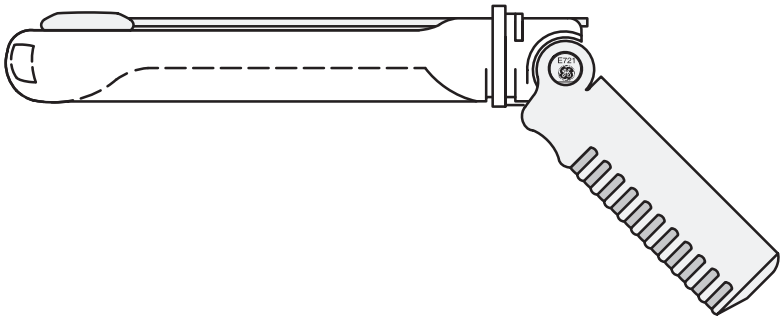


Illustration 57. TV0° Biopsy Guide

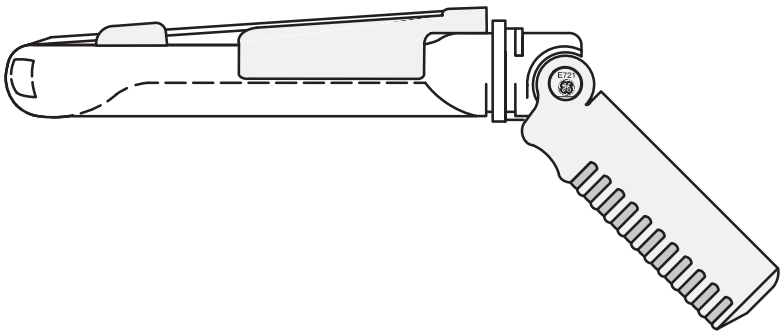


Illustration 58. TR5° Biopsy Guide

Biopsy Guide Attachment

Convex and Linear probes have optional biopsy guide attachments for each probe. The guide consists of a non-disposable bracket to attach to the probe, disposable needle clip to attach to the bracket and disposable needle barrels.

The disposable needle barrels are available for a variety of needle sizes.

CAUTION Please refer to the manufacturer's instructions included in the biopsy kit.

Fixed Needle Guide Assembly

Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.

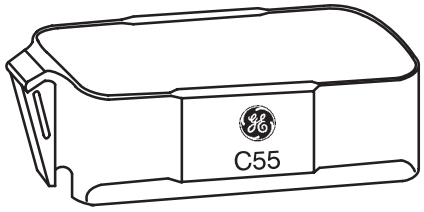


Illustration 59. C55 Biopsy Guide Bracket

Fixed Needle Guide Assembly (cont'd)

Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

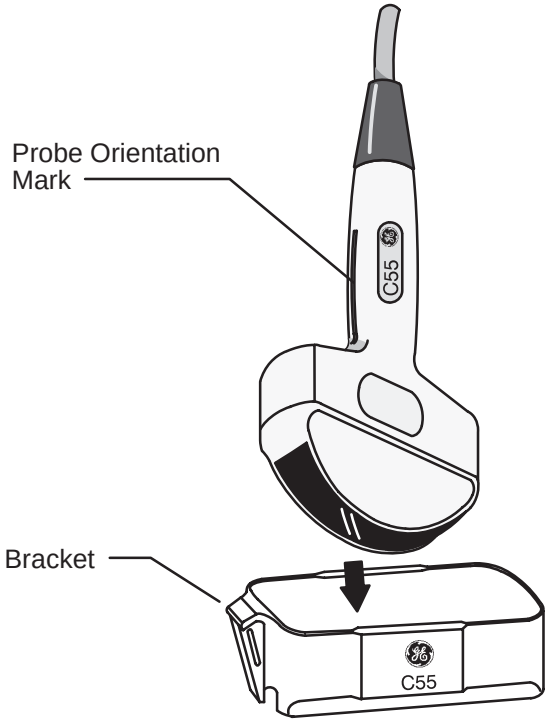


Illustration 60. Probe/Bracket Alignment

Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.

Place an adequate amount of coupling gel on the face of the probe.

Fixed Needle Guide Assembly (cont'd)

Place the proper sanitary sheath over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

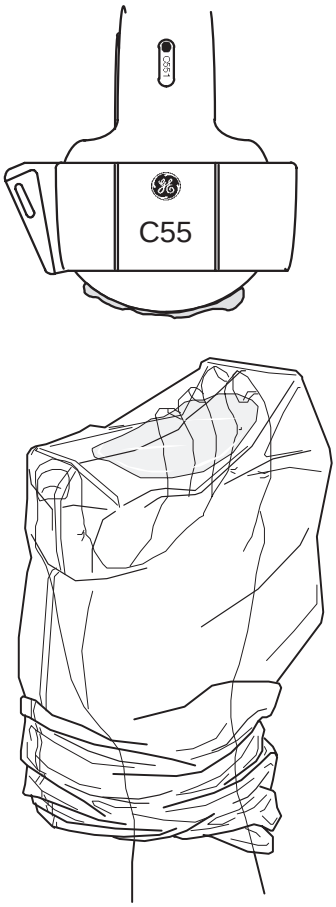


Illustration 61. Applying Sanitary Sheath

Fixed Needle Guide Assembly (cont'd)

Snap the needle clip onto the biopsy guide bracket.

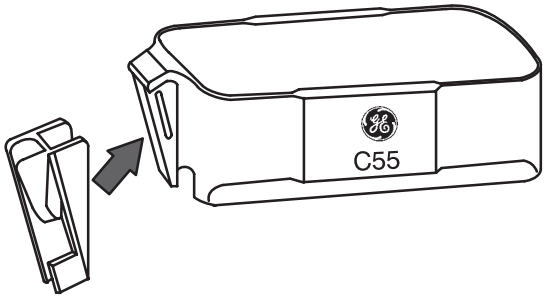


Illustration 62. Needle Clip Attachment

Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

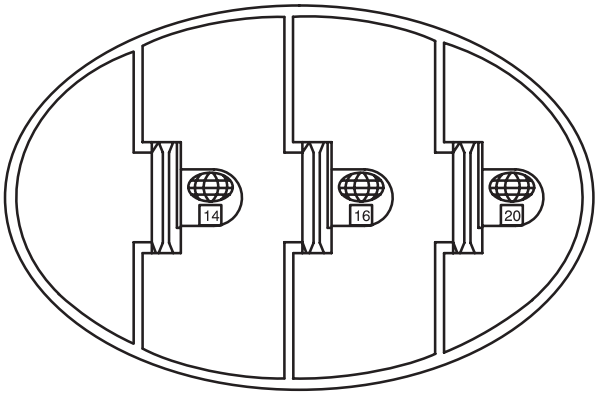


Illustration 63. Needle Barrels

Fixed Needle Guide Assembly (cont'd)

Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

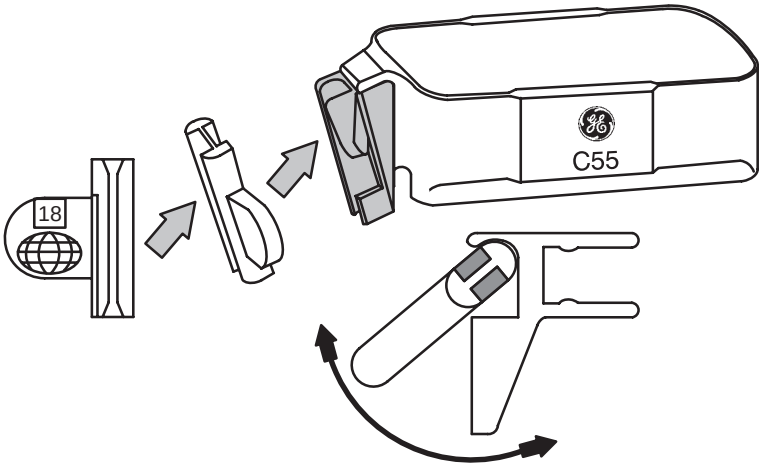


Illustration 64. Needle Barrel Installation

CAUTION Ensure that all guide parts are seated properly prior to perfoming a biopsy.

Multi-Angle Biopsy Guide Assembly

WARNING *Do Not attempt to use the multi-angle biopsy bracket and needle guide until the manufacturer's instructions, provided with the biopsy bracket and needle guide in the kit, have been read and thoroughly understood.*

Scan the patient and identify the target for biopsy. Move the probe to locate the target to the center of the image. Enable the system biopsy guide zone and try guide zone angles MBX1 to MBX3 to decide the best angle setting for needle path.

NOTE: Please refer to section Control Keys to Customizing Your System to set the biospy guide zone type.

Identify the appropriate biopsy guide bracket by matching the label on the bracket with the probe to be used.

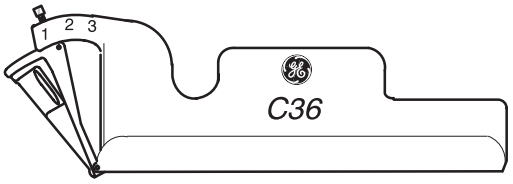


Illustration 65. C36 Multi-Angle Biopsy Guide Bracket

Multi-Angle Biopsy Guide Assembly (cont'd)

Orient the bracket so that the needle clip attachment will be on the same side as the probe orientation mark (ridge).

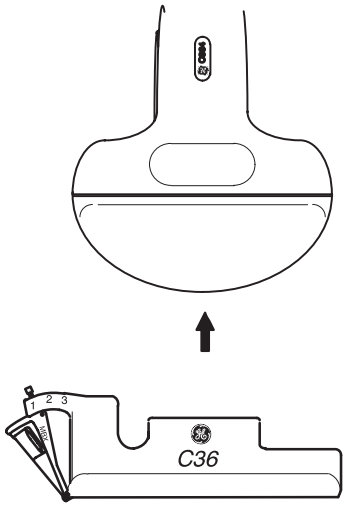


Illustration 66. Probe/Bracket Alignment

Attach the biopsy bracket to the probe by sliding the bracket over the end of the probe until it clicks or locks in place.

Multi-Angle Biopsy Guide Assembly (cont'd)

Pull up on the knob to freely move the needle guide attachment. Align the knob with the selected position of the needle guide attachment from MBX-1, MBX-2 and MBX-3, to match the guide zone display on the ultrasound system.

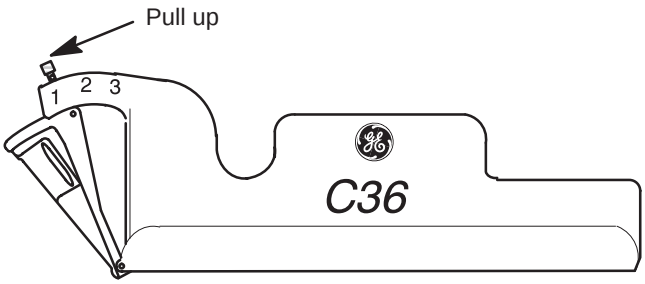


Illustration 67. Select the angle position

Multi-Angle Biopsy Guide Assembly (cont'd)

Push the knob down into the desired slot to secure the angle position of the needle guide attachment.

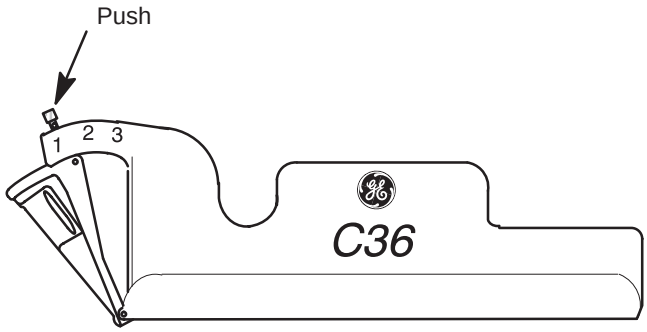


Illustration 68. Fix the angle position

CAUTION

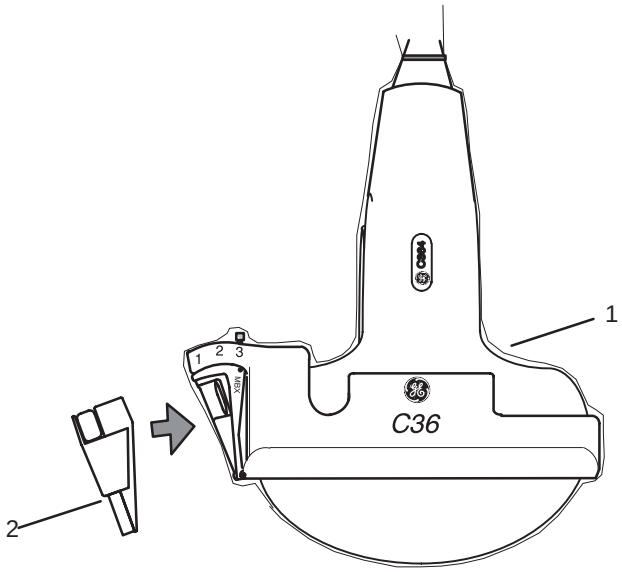
Hold the bracket in place on the probe when pushing the knob to secure the angle position of the needle guide attachment. Excessive force may cause the bracket to release from the probe.

Place an adequate amount of coupling gel on the face of the probe.

Place the proper sanitary sheath tightly over the probe and biopsy bracket. Use the rubber bands supplied to hold the sheath in place.

Multi-Angle biopsy Guide Assembly (cont'd)

Snap the needle clip onto the biopsy guide bracket.



1 Sheath

2 Needle Clip

Illustration 69. Fixing the Needle Clip Attachment

Push the locking mechanism towards the bracket to secure the lock. Make sure the needle guide is firmly attached to the bracket.

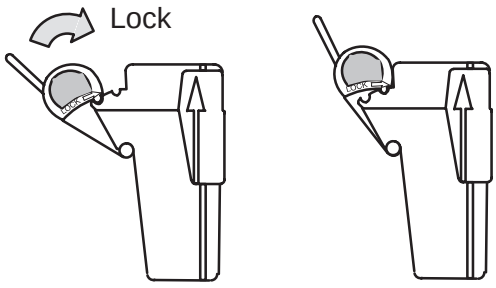


Illustration 70. Locking the Needle Clip

Multi-Angle Biopsy Guide Assembly (cont'd)

Choose the desired gauge (size) needle barrel. Twist it back and forth to remove it from the plastic tree.

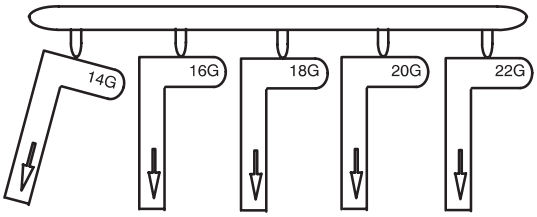


Illustration 71. Needle Barrel Selection

Place the needle barrel into the needle clip with the desired gauge facing the needle clip and snap into place.

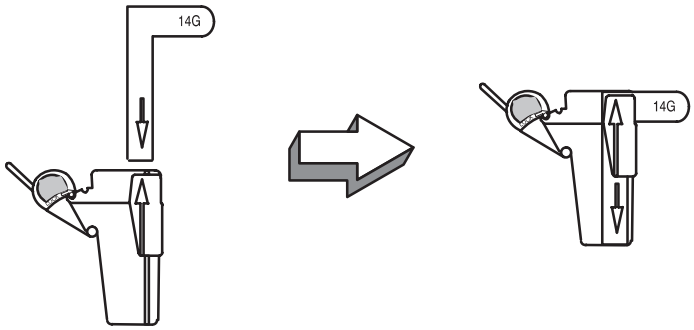


Illustration 72. Needle Barrel Installation

CAUTION Ensure that all guide parts are seated properly prior to perfoming a biopsy.

Biopsy Needle Path Verification

To verify that the path of the needle is accurately indicated within the guide zone on the system monitor, perform the following:

- Properly install the bracket and biopsy guide.
- Scan in a container filled with water.
- Display the biopsy guide zone on the monitor.
- Ensure that the needle echo falls within the guide zone markers.



NOTE: The guide zone center line can be displayed by pressing the ***Measurement*** *key.*

The Procedure

- Place coupling gel on the scanning surface of the probe/sheath/biopsy guide assembly.
- Invoke the biopsy guidelines by pressing Ctrl B.



NOTE: The selected biopsy zone angle designation is displayed on the left hand side of the image display.

- Scan to locate the target. Center the target in the electronic guideline path.
- Place the needle in the guide between the needle barrel and needle clip.
- Press the *MEASUREMENT* key, to invoke the injection depth. A dotted line appears in the middle of the Zone and an open ended ">" cursor appears on this line. The position of the cursor gives the injection depth which is displayed on the left side of the image display. (Refer to page 122 for details of Biopsy Depth Measurements.
- Use the *TRACKBALL* to move the cursor along the center line. The injection depth values are computed and displayed on the left side of the image display.

Post Biopsy

When the biopsy is complete, remove the needle barrel, needle clip and probe sheath. Properly dispose of these items in accordance with current facility guidelines.

The biopsy bracket can be sterilized and reused.

E72 Probe Biopsy Guide

Preparation

To prepare the E72 for use:

Remove the probe from the box and carefully examine it for any damage.

If the biopsy guide is to be attached, use the filling removal tool (Illustration 73) to clean out the attachment area on the probe head.

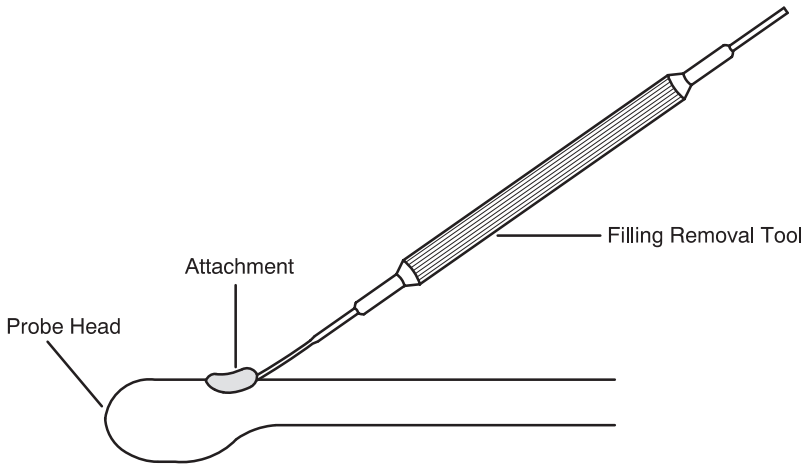


Illustration 73. Attachment Filling Removal

Clean, then disinfect/sterilize the probe.

Note: Ensure that protective gloves are worn.

Preparation (cont'd)

Install the sheath:

Remove the sheath from its package. Do not unroll the sheath.

Note: Remember to rinse all sanitary probe sheaths of powder before placing on the probe. Powder can degrade the displayed image.

Place a small amount of ultrasound gel inside the sheath tip (the gel is between the sheath inner surface and the probe aperture).

Note: Ensure that only acoustic coupling gel is used for this purpose.

Place the sheath tip over the probe aperture and then pull the sheath end toward the probe handle.

Inspect the sheath.

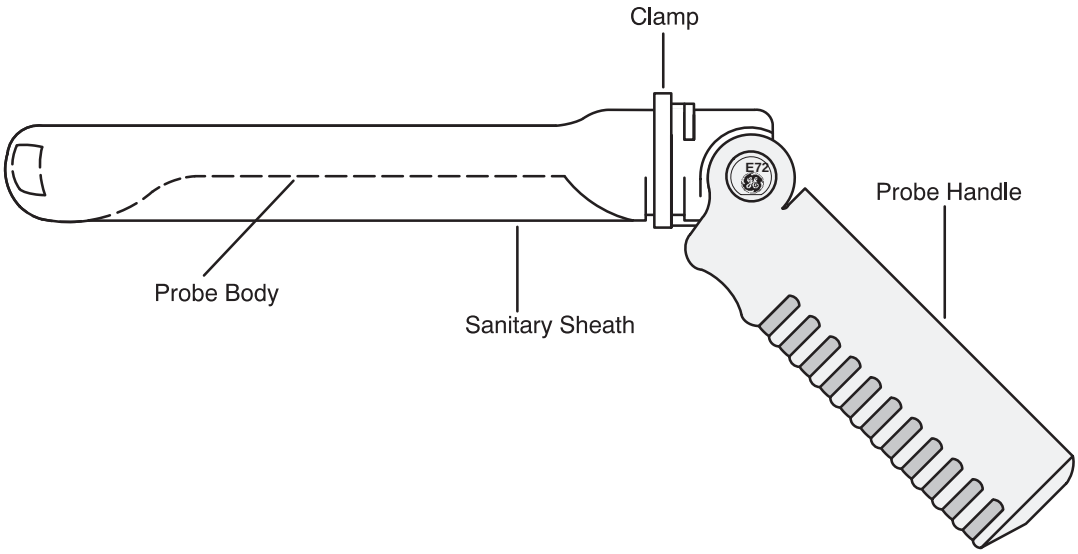


Illustration 74. Probe with Sheath

Place a rubber band/twist lock or clamp over the sheath end of the probe shaft (Illustration 74). Ensure the rubber band/twist lock or clamp is tight around the sheath. Rub a finger over the tip of the probe to ensure all air bubbles have been removed.

Preparation (cont'd)

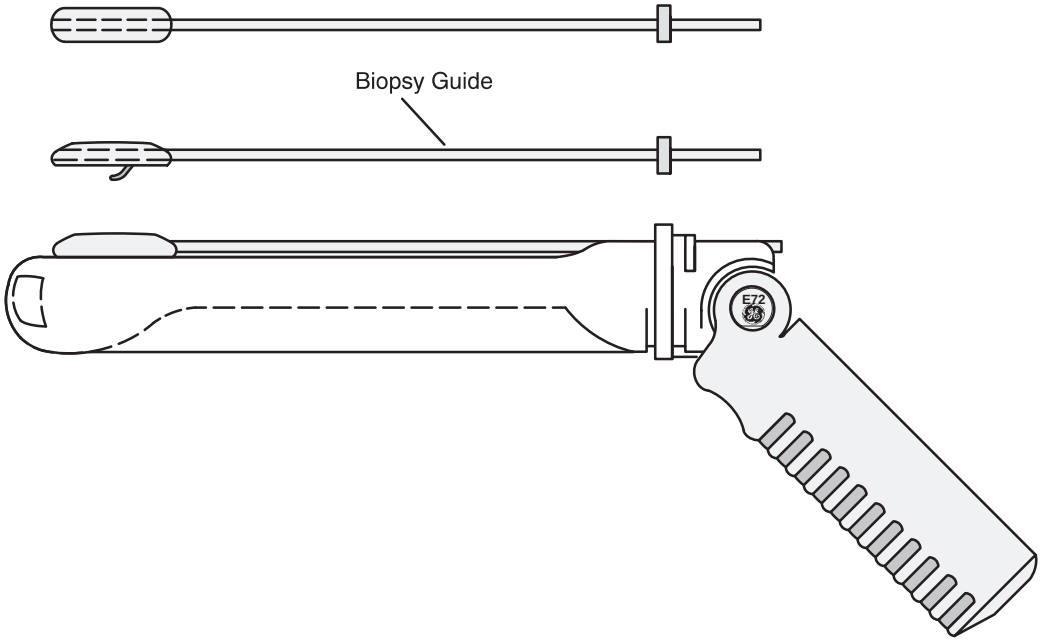


Illustration 75. Biopsy Guide

If a biopsy is to be performed, snap the metal biopsy guide on to the probe over the sheath (Illustration 75).

Place a small amount of ultrasound gel on the gel-filled sheath tip **outer** surface.

Scanning

Scan the patient. The probe handle orientation mark indicates the image scan plane. Be sure that the Image Reverse function is Off.

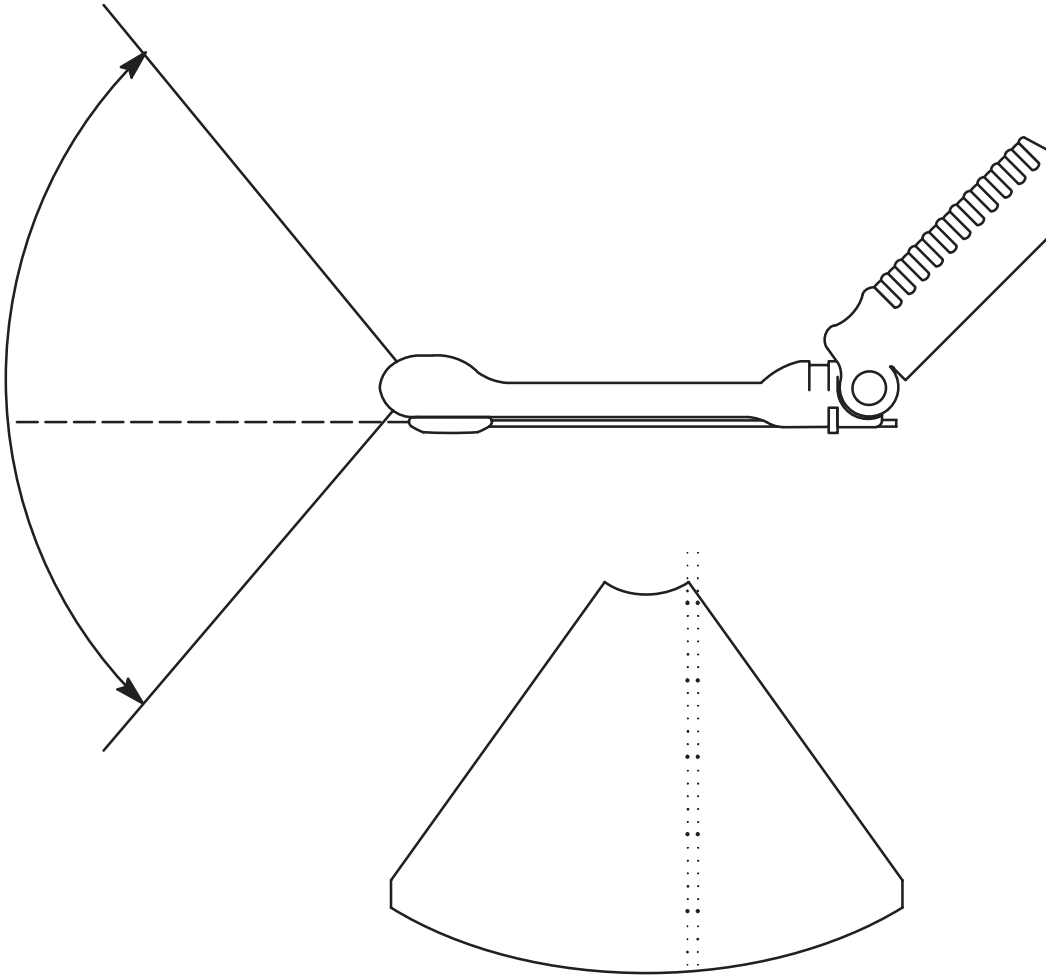


Illustration 76. Probe and Guideline Alignment

Rotate, retract, or advance the probe, as necessary, to see all pertinent anatomy.

If a biopsy is being performed, activate the biopsy guidelines.

Scan the patient to determine the correct puncture depth and site **before** inserting the needle.

Post Biopsy

If the exam is over:

Remove the biopsy guide and twist lock/clamp. Remove and properly dispose of the sheath.

Thoroughly clean the probe and equipment. Refer to your institution's infection control guidelines for disinfection/sterilization protocols.

After sterilization, return the probe to its carrying case.

Biopsy Probes

Probe	Appln.	Catalogue #/ GPN #	Needle Sizes	Probe Options
C36 3.5 MHz Convex	Abdominal, OB/GYN	H45252CF/ 2107922	14, 16, 18, 20, 22, 25 AWG	E8385 MD C36 Biopsy Starter Kit including reusable attachment and 5 disposable procedure kits E8385 LC Disposable Replacement Kit for Biopsy needle guide.
C55 5.0 MHz Convex	Abdominal, OB/GYN	H45252CE/ 2107925	14, 16, 18, 20, 22, 25 AWG	E8385 MF C55 Biopsy Starter Kit including reusable attachment and 5 disposable procedure kit. E8385 LC Disposable Replacement Kit for Biopsy needle guide.
E72 6.5 MHz (TV/TR)	Endocavitary	H45252MT/ 2107928	Requires 25 cm needles 18 AWG needle	H46222AD Biopsy Guide attachment Non–disposable type H4550BG
L76 7.5 MHz Linear	Small Parts	H45252HP/ 2107910	14, 16, 18, 20, 22, 25 AWG	E8385 LA Biopsy Starter Kit including resuable attachment and 5 disposable procedure kits. E8385 LC Disposable Replacement Kit for Biopsy Needle guide.

Table 43. Probe Biopsy Chart

Biopsy Probes

Probe	Appln.	Catalogue #/ GPN #	Needle Sizes	Probe Options
C31 3.5MHz Convex	Abdominal, Cardiac	H45252CS/ 2175994	14, 16, 18, 20, 22, 25 AWG	TBD (To Be Determined) Single Angle Biopsy Bracket E8385 LC Disposable Replacement Kit for Biopsy needle guide.
VE5 5.0 MHz	Abdominal	H45252VE/ 2214000	–	Does't Support Biopsy

Table 44. Probe Biopsy Chart

Troubleshooting and Maintenance

Troubleshooting

Maintenance

This section describes basic troubleshooting and maintenance available to the user.

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Troubleshooting

Overview

Listed in this section are problems or system messages that may be encountered, possible causes for the problem or message, and the appropriate action to take to correct the situation. Consult *Who to Contact* on page 313 if additional information or assistance is needed.

Troubleshooting the LOGIQ™ α100

Problem	Cause	Solution
When Power is turned ON, the screen still appears blank.	Power Cable may have come out from socket	Reconnect the Power Cable.
	The Monitor brightness and contrast may have been tampered with.	Adjust the Monitor brightness and contrast.
	The power fuse may have blown.	Turn off power switch. Replace power supply unit.
No image appears on the screen.	The *FREEZE* key may be on.	Check the *FREEZE* key and turn it off.
Dark vertical stripes appear on the image	The probe may be cracked or particles may be stuck to the surface of the probe.	Clean the surface of the probe.
Blinking dots of noise appear on the image.	The LOGIQ™ α100 may be placed near other ultrasonic units.	Move the LOGIQ™ α100 away from other units.
Wavering image on the display screen.	LOGIQ™ α100 may be close to some magnetic field.	Move the unit away from any magnetic field.
No scanned image appears when probe is placed on a patient.	The Gain control may be at 0dB.	Increase the Gain.

Table 45. Console Troubleshooting

Troubleshooting the Videographic Printer (Option)

Trouble Faced	Cause of Trouble	Solution
Moisture condensation	A heater was turned on OR Room humidity suddenly rose OR Printer was abruptly moved from a cold place to a warmer one.	Let the unit dry out for 1–2 hours OR Gradually raise the temperature until moisture evaporates. THEN Press the **Feed** button while gently pulling on the edge of the paper so it feeds through smoothly.
Paper is Jammed	Moisture condensation OR Paper inserted crooked	Raise the Head Set lever to **OFF**. Carefully remove the stuck paper by hand (Do not use pointed devices. They may damage the printing head or the rear surfaces of the platen) Make sure there are no creases in the paper. Insert the paper straight into the platen.
Printer Head is dirty	After printing 2–3 rolls of paper, dust and grime are collected on the head	Following the Paper Loading procedure, insert the supplied Head Cleaning Sheet. Turn the Head Set Lever **ON.** Pull the cleaning sheet paper edge strongly. Repeat if necessary.
After printing almost totally black pictures, white prints turn black.	The printer has printed 20 or more almost totally black pictures.	Switch the Posi/Nega selector to the opposite position for a while.
After printing almost totally black picture, the subsequent prints become faint.	The printer has printed dozens of almost totally black pictures. A protective circuit is preventing the head from overheating.	Stop printing for a while. When the temperature of the printing head drops back to normal, printing resumes.
Images come out black or white	Contrast/Brightness mis-adjusted.	Check contrast/brightness. Adjust if necessary.
Alphanumerics are blurred	Field/Frame switch misadjusted.	Adjust Field/Frame switch to Frame position.

Table 46. Printer Troubleshooting

Who To Contact

USA

GE Medical Systems
Ultrasound Service Engineering
4855 W. Electric Avenue
Milwaukee, WI 53219

TEL: (1) 800–437–1171
FAX: (1) 414–647–4090

Customer Answer Center

TEL: (1) 800–682–5327
or (1) 414–524–5255

CANADA

GE Medical Systems
Ultrasound Service Engineering
4855 W. Electric Avenue
Milwaukee, WI 53219

TEL: (1) 800–664–0732

Customer Answer Center

TEL: (1) 800–682–5327
or (1) 414–524–5255

LATIN & SOUTH AMERICA

GE Medical Systems
Ultrasound Service Engineering
4855 W. Electric Avenue
Milwaukee, WI 53219

TEL: (1) 305–735–2304

Customer Answer Center

TEL: (1) 800–682–5327
or (1) 414–524–5255

EUROPE

GE Ultrasound Europe
Kranzbuhler GmbH & Co. KG
Beethovenstr. 239
42655 Solingen, GERMANY

TEL: (49) (212) 2802 0
FAX: (49) (212) 2802 28

ASIA

GE Medical Systems Asia
Asia Support Center
67–4 Takakura cho, Hachiouji–shi
Tokyo, 192
JAPAN

TEL: (81) 426–56–0033
FAX: (81) 426–56–0053

Who To Contact (cont'd)

AUSTRIA
GE GesmbH Medical Systems Austria
Prinz Eugen Strasse 8/8
A–1040 WIEN

TEL: 0660 8651 toll free
FAX: +43 1 505 38 74
TLX: 136314

BELGIUM
GE Medical Systems Benelux
Gulkenrodestraat 3
B–2160 WOMMELGEM

TEL: +32 0 3 320 12 11
FAX: +32 0 3 320 12 59
TLX: 72722

DENMARK
GE Medical Systems Danmark
Skovlytoften 4
DK–2840 HOLTE

TEL: +45 45 51 00 55
FAX: +45 42 42 59 89

FRANCE
GE Medical Systems
738 rue Yves Carmen
F–92658 BOULOGNE CEDEX

TEL: +33 1 46 10 01 30
FAX: +33 1 46 10 01 20

GERMANY
GE Ultrasound Europe
Kranzbuhler GmbH & Co. KG
Beethovenstr. 239
42655 Solingen, GERMANY

TEL: (49) (212) 2802 0
FAX: (49) (212) 2802 28

GREECE
GE Medical Systems Hellas
41, Nikolaou Plastira Street
G–171 21 NEA SMYRNI

TEL: +30 1 93 24 582
FAX: +30 1 93 58 414

INDIA
Wipro GE Medical Systems Ltd.
Ultrasound Service Engineering
No. 4 Kadugodi Plantation Industrial Area
Sadaramangala
Bangalore – 560 067
INDIA

TEL: (91) (80) 845 3359
60, 61 or 62
FAX: (91) (80) 8452924

ITALY
GE Medical Systems Italia
Via Monte Albenza 9
I–20052 MONZA

TEL: +39 39 20 881
FAX: +39 39 73 37 86
TLX: 3333 28

Who to Contact (cont'd)

NETHERLANDS

GE Medical Systems Nederland B.V.
Atoomweg 512
NL–3542 AB UTRECHT

TEL: +31 304 79711
FAX: +31 304 11702

POLAND

GE Medical Systems Polska
Krzywickiego 34
P–02–078 WARSZAWA

TEL: +48 2 625 59 62
FAX: +48 2 615 59 66

PORTUGAL

GE Medical Systems Portuguesa S.A.
Rua Sa da Bandeira, 585
Apartado 4094
P–4002 PORTO CODEX

TEL: +35122007696/97
FAX: +351 2 2084494
TLX: 22804

RUSSIA

GE VNIIEM
Mantulinskaya UI. 5A
123100 MOSCOW

TEL: +7 095 956 7037
FAX: +7 502 220 32 59
TLX: 613020 GEMED SU

SPAIN

GE Medical Systems España
Hierro 1 Arturo Gimeno
Poligono Industrial I
E–28850 TORREJON DE ARDOZ

TEL: +34 1 676 4012
+34 1 676 4047
FAX: +34 1 675 3364
TLX: 22384 A/B GEMDE

SWEDEN

GE Medical Systems
PO–BOX 1243
S–16428 KISTA

TEL: +46 87 50 57 00
FAX: +46 87 51 30 90
TLX: 12228 CGRSWES

SWITZERLAND

GE Medical Systems (Schweiz) AG
Sternmattweg 1
CH–6010 KRIENS

TEL: +41 41 425577
FAX: +41 41 421859

Who to Contact (cont'd)

TURKEY

GE Medical Systems Turkiye A.S.
Mevluk Pehliran Sodak
Yilmaz Han, No 24 Kat 1
Gayretteppe
ISTANBUL

TEL: +90 212 75 5552
FAX: +90 212 211 2571

UNITED KINGDOM

IGE Medical Systems
Coolidge House
352 Buckingham Avenue
SLOUGH
Berkshire SL1 4ER

TEL: +44 753 874000
FAX: +44 753 696067

Manufacturer

Wipro GE Medical Systems Ltd.

Ultrasound Service Engineering
No. 4 Kadugodi Plantation Industrial Area
Sadaramangala
Bangalore – 560 067
INDIA

TEL: (91) (80) 845 3359
60, 61 or 62
FAX: (91) (80) 8452924
(91) (80) 8453222

Maintenance

Overview

Refer to the *Periodic Maintenance* chapter in the LOGIQ™ α100 Service Manual (2139768) for any additional maintenance guidance. Regular maintenance of the LOGIQ™ α100 system is necessary for safe and trouble free use. Periodic maintenance helps in reducing equipment downtime, service costs and operational hazards.

Contact the local service representative for parts or planned maintenance inspections. It is recommended that maintenance be performed on the system every six months.

Inspecting the System

Daily Check List



Examine the following on a daily basis:

- **After each use, remove the coupling gel from the probe by wiping with a soft cloth or rinsing with flowing water.**
- Check the probe and probe cable for cracks or deterioration.

Weekly Check List



The system requires weekly care and maintenance to function safely and properly. Clean the following on a weekly basis:

- Check *probes* for damages
- Check system *power cord* for any cracks or damages

Turn OFF the system and start the cleaning function.

- Moisten a soft, non-abrasive cloth with a mild general purpose, non-abrasive soap and water solution and clean around the *unit* and the system cabinet



Do not spray any liquid directly into the unit.

- Clean the *display monitor* with a soft, slightly moistened cloth. If the monitor is still soiled, use a slightly soft moistened cloth with detergent.

CAUTION



When cleaning, make sure not to scratch the monitor.

Do not use a hydrocarbon base glass cleaner on a monitor with an anti-glare shield. Prolonged use of such cleaners damages the shield.

Weekly Check List (cont'd)



Do not clean the CRT filter and the monitor with Isoprophyl Alcohol.

- Use a soft, slightly moistened cloth to clean the *keyboard controls*. Use a toothpick to remove solids around the *gain knob*.
- Clean the *foot switch* with a soft, non-abrasive, slightly moistened cloth with non-abrasive soap and water solution.
- Wipe the external surface of the foot switch and dry with a soft, clean cloth.
- Clean the *VCR* with a soft clean dry cloth. Clean the record and playback heads with a soft non-abrasive cleaning system.



Do not use a wet cloth or any cleaning fluid because it may enter and damage the unit.

- For more information refer to the VCR's Operator Manual.
- Turn OFF the power and, if possible, disconnect the power cord before cleaning the *Video Graphic Printer*.
- Wipe the external surface with a soft, clean, dry cloth.
- Remove stubborn stains with a cloth lightly dampened with a mild detergent solution.

Weekly Check List (cont'd)

Never use strong solvents, such as thinner or benzine, or abrasive cleansers because they will damage the cabinet.

- To clean the surface of the print head run the cleaning sheet (provided with the printer) through the printer.
- For more information, refer to the Video Graphic Printer's Operator Manual.

Monthly Check List



Examine the following on a monthly basis:

- Visually inspect the unit every month.
- Check for mechanical problems, or keyboard problems.
- Check the electrical and power cables for cracks, cuts, nicks or abrasions
- Check the equipment for loose or missing hardware.
- Check the *TRACKBALL* and clean, if necessary. For details on trackball maintenance, refer to Page 321.
- Clean the Video page printer and display monitor.

CAUTION

To avoid electrical shock hazard, do not remove panels or covers from the console. This servicing must be performed by qualified service personnel. Failure to do so could cause serious injury.

If any defects are observed or malfunctions occur, do not operate the equipment; inform a qualified service person. Contact a service representative for information.

LOGIQ™ α100 Service Manual (2139768).

Trackball Maintenance

The trackball needs to be kept clean in order to operate smoothly. When dirt sticks inside the trackball, it's operation can be erratic or impaired. Regularly clean the trackball according to the following procedure.

Obtain the following items for cleaning the trackball

The Trackball Maintenance Kit comprises of the following:

Trackball Tool (Opener)
Cotton Bud (impregnated)
TFC Dry Cleaner

OR

Trackball Tool (Opener)
Cotton Bud, Ethanol, isopropyl alcohol or VCR head cleaner and dry cloth.

Removal of the Retainer Ring

1. Turn OFF the system, and unplug the unit.
2. Insert the projected end of the trackball tool into the guide hole of the retainer ring (2 places).

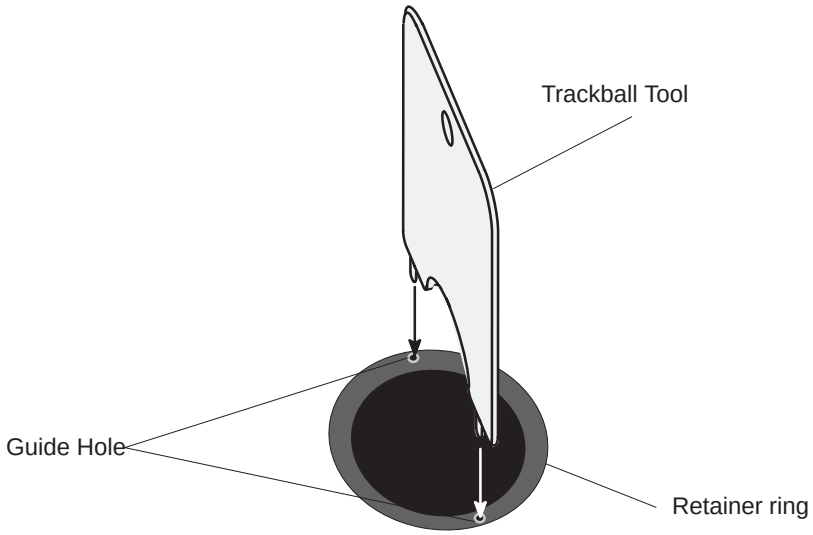


Illustration 77 Removal of the Retainer Ring

Removal of the Retainer Ring (cont'd)

3. Rotate the trackball tool in a counterclockwise direction smoothly.

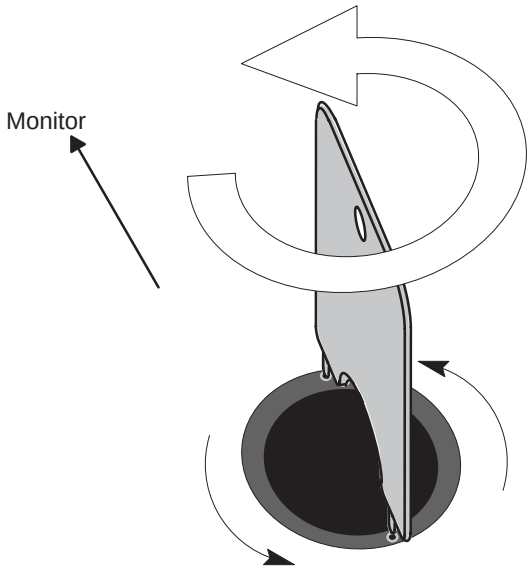


Illustration 52 Removal of the Retainer Ring (cont'd)

4. Remove the Retainer ring from the keyboard.
5. Take out the black ball.

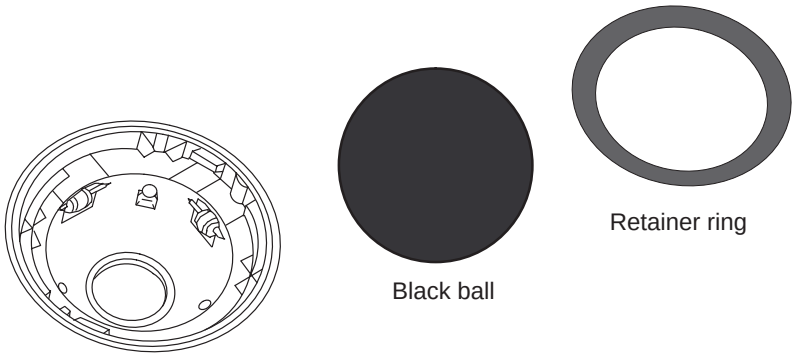


Illustration 52 Removal of the Retainer Ring (cont'd)

Cleaning the Trackball

6. Wipe any oil and dust from the black ball using the TFC Dry Cleaner of the maintenance kit or a dry cloth.

NOTE: Set the retainer ring and black ball on a flat surface to avoid losing these parts.

7. Wipe any oil and dust from the 3 places that support the black ball (a small spherical ball) with a cotton bud.

CAUTION When cleaning the trackball housing, make sure not to spill or spray any liquid into the trackball housing (system/keyboard). Use either ethanol, isopropyl alcohol or VCR head cleaner to clean the trackball assembly.

Avoid other solvents that may damage the rubber and mechanical parts of the trackball assembly.

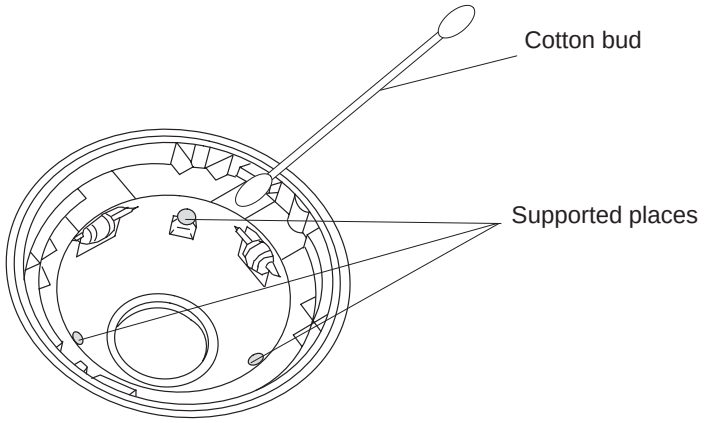


Illustration 78 Cleaning the Trackball

Cleaning the Trackball (cont'd)

8. Wipe any oil and dust from the 2 rubber rollers with a cotton bud (impregnated) dipped in alcohol or cotton bud with ethanol, isopropyl alcohol or VCR head cleaner.

CAUTION When cleaning the rubber rollers do not use excessive force. If the rubber rollers anchoring location is damaged, rollers can slip and it will hinder the smooth operation of the trackball.

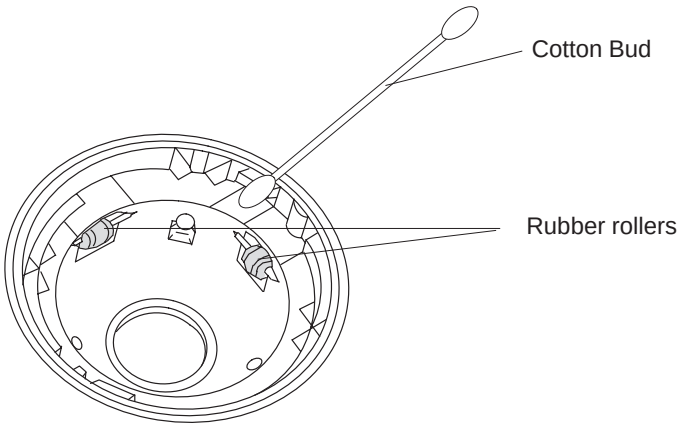


Illustration 53 Cleaning the Trackball (cont'd)

Fixing the Trackball and Retainer Ring

9. Insert the black ball.
10. Insert the retainer ring.

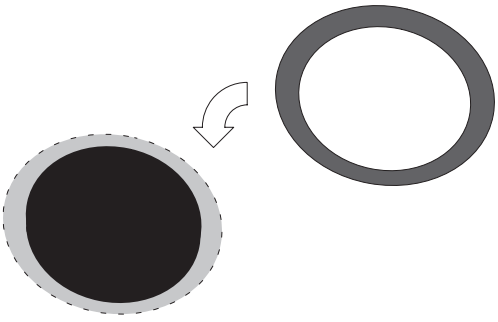


Illustration 79 Fixing the Trackball and Retainer Ring

Fixing the Trackball and Retainer Ring (cont'd)

11. Insert the trackball tool from the maintenance kit into the guide holes (2 places on the retainer ring), and rotate the trackball tool in a clockwise direction to lock the retainer ring.

CAUTION When installing the retainer ring, do not use excessive force to lock the retainer ring. Excessive force will damage the retainer ring and trackball tool.

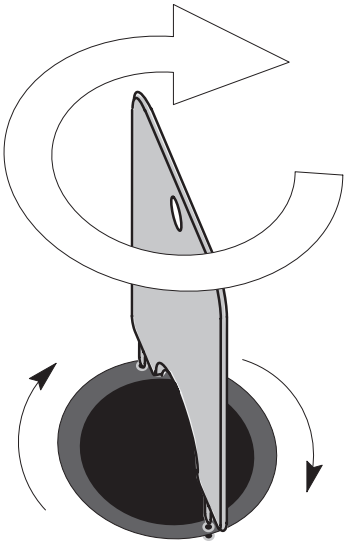


Illustration 54 Fixing the Trackball and Retainer Ring (cont'd)

NOTE: To request additional trackball maintenance kits or information, contact the local Applications, Sales or Service Representative.

Planned Maintenance

The following maintenance schedule is suggested for the system and probes to ensure optimum operation and safety.

Do the Following	Daily	Weekly	Monthly
Inspect the Unit			X
Clean Foot switch		X	
Clean Monitor		X	
Clean Keyboard		X	
Clean Trackball			X
Clean VGP		X	
Clean the System Cabinet		X	
Clean the VCR		X	
Inspect Probes	X		
Power Cord		X	

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OB Tables

Tokyo University Version

Osaka University Version

U.S/European Version

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BPD : Tokyo Unit : BPD (mm) Age (Day) SD (Day)

BPD	Age	BPD	Age	BPD	Age
20	12W1D ± 6	53	22W0D ± 6	86	35W0D ± 9
21	12W3D ± 6	54	22W3D ± 6	87	35W4D ± 9
22	12W5D ± 6	55	22W6D ± 6	88	36W1D ± 9
23	13W1D ± 6	56	23W1D ± 6	89	36W6D ± 9
24	13W3D ± 6	57	23W3D ± 6	90	37W3D ± 9
25	13W5D ± 6	58	23W6D ± 6		
26	14W0D ± 6	59	24W1D ± 6		
27	14W2D ± 6	60	24W3D ± 6		
28	14W4D ± 6	61	24W6D ± 7		
29	14W4D ± 6	62	25W1D ± 7		
30	15W1D ± 5	63	25W4D 7		
31	15W3D ± 5	64	25W6D ± 7		
32	15W5D ± 5	65	26W1D ± 7		
33	16W0D ± 5	66	26W4D ± 7		
34	16W2D ± 5	67	26W6D ± 7		
35	16W4D ± 5	68	27W2D ± 7		
36	16W6D ± 5	69	27W5D ± 7		
37	17W1D ± 5	70	28W0D ± 7		
38	17W4D ± 5	71	28W3D ± 8		
39	17W6D ± 5	72	28W5D ± 8		
40	18W1D ± 5	73	29W1D ± 8		
41	18W3D ± 5	74	29W4D ± 8		
42	18W5D ± 5	75	30W0D ± 8		
43	19W0D ± 5	76	30W3D ± 8		
44	19W2D ± 5	77	30W6D ± 8		
45	19W5D ± 6	78	31W2D ± 8		
46	20W0D ± 6	79	31W4D ± 8		
47	20W2D ± 6	80	32W1D ± 8		
48	20W4D ± 6	81	32W4D ± 8		
49	20W6D ± 6	82	32W6D ± 8		
50	21W1D ± 6	83	33W2D ± 9		
51	21W4D ± 6	84	34W0D ± 9		
52	21W6D ± 6	85	34W3D ± 9		

Table 47. BPD : Tokyo

CRL : Tokyo Unit : CRL (mm) Age (Day) SD (Day)

CRL	Age	CRL	Age
13	7W6D ± 8	41	11W3D ± 7
14	8W0D ± 9	42	11W4D ± 7
15	8W1D ± 10	43	11W4D ± 7
16	8W2D ± 8	44	11W5D ± 7
17	8W3D ± 9	45	11W6D ± 7
18	8W4D ± 10	46	12W0D ± 7
19	8W5D ± 8	47	12W0D ± 7
20	8W6D ± 9	48	12W1D ± 7
21	9W0D ± 7	49	12W2D ± 7
22	9W1D ± 7	50	12W2D ± 7
23	9W2D ± 7		
24	9W3D ± 7		
25	9W4D ± 7		
26	9W5D ± 7		
27	9W5D ± 7		
28	9W6D ± 7		
29	10W0D ± 7		
30	10W1D ± 7		
31	10W2D ± 7		
32	10W3D ± 7		
33	10W4D ± 7		
34	10W4D ± 7		
35	10W5D ± 7		
36	10W6D ± 7		
37	11W0D ± 7		
38	11W1D ± 7		
39	11W1D ± 7		
40	11W2D ± 7		

Table 48. CRL : Tokyo

FL : Tokyo Unit : FL (mm) Age (Day) SD (Day)

FL	Age	FL	Age
33	20W3D ± 6	61	33W4D ± 8
34	20W6D ± 6	62	34W1D ± 8
35	21W2D ± 6	63	34W5D ± 8
36	21W6D ± 6	64	35W2D ± 8
37	22W2D ± 6	65	35W6D ± 8
38	22W5D ± 6	66	36W4D ± 8
39	23W1D ± 6	67	37W1D ± 8
40	23W5D ± 6	68	38W0D ± 7
41	24W1D ± 6	69	38W5D ± 7
42	24W4D ± 6	70	39W5D ± 7
43	25W0D ± 6	71	40W6D ± 6
44	25W3D ± 6		
45	25W6D ± 6		
46	26W3D ± 7		
47	26W6D ± 7		
48	27W2D ± 7		
49	27W5D ± 7		
50	28W1D ± 7		
51	28W4D ± 7		
52	29W1D ± 7		
53	29W4D ± 7		
54	30W0D ± 7		
55	30W4D ± 7		
56	31W0D ± 7		
57	31W3D ± 7		
58	32W0D ± 7		
59	32W4D ± 8		
60	33W0D ± 8		

Table 49. FL : Tokyo

GS : Tokyo Unit : GS (mm) Age (Day) SD (Day)

GS	Age	GS	Age
12	4W3D ± 7	41	9W1D ± 1
13	4W4D ± 7	42	9W2D ± 1
14	4W5D ± 7	43	9W2D ± 1
15	4W6D ± 7	44	9W3D ± 1
16	5W1D ± 7	45	9W4D ± 1
17	5W2D ± 7	46	9W5D ± 1
18	5W3D ± 7	47	9W6D ± 1
19	5W5D ± 7	48	10W0D ± 1
20	5W6D ± 7	49	10W1D ± 1
21	6W0D ± 7	50	10W2D ± 1
22	6W1D ± 7		
23	6W2D ± 7		
24	6W4D ± 7		
25	6W5D ± 7		
26	6W6D ± 8		
27	7W0D ± 9		
28	7W1D ± 10		
29	7W2D ± 8		
30	7W3D ± 1		
31	7W4D ± 1		
32	7W6D ± 1		
33	8W0D ± 1		
34	8W1D ± 1		
35	8W2D ± 1		
36	8W3D ± 1		
37	8W4D ± 1		
38	8W5D ± 1		
39	8W6D ± 1		
40	9W0D ± 1		

Table 50. GS : Tokyo

LV : Tokyo Unit : LV (mm) Age (Day) SD (Day)

LV	Age	LV	Age
44	22W0D ± 5	71	33W0D ± 11
45	22W3D ± 5	72	33W3D ± 11
46	22W5D ± 5	73	34W0D ± 11
47	23W0D ± 5	74	34W3D ± 11
48	23W2D ± 5	75	35W0D ± 11
49	23W5D ± 6	76	35W4D ± 11
50	24W0D ± 6	77	36W0D ± 11
51	24W3D ± 6	78	36W4D ± 11
52	24W5D ± 6	79	37W1D ± 10
53	25W1D ± 7	80	37W5D ± 10
54	25W3D ± 7	81	38W1D ± 10
55	25W6D ± 7	82	38W5D ± 10
56	26W1D ± 8	83	39W2D ± 10
57	26W4D ± 8	84	39W5D ± 10
58	27W0D ± 8	85	40W2D ± 10
59	27W3D ± 8	86	40W5D ± 10
60	27W6D ± 9		
61	28W2D ± 9		
62	28W5D ± 9		
63	29W1D ± 9		
64	29W4D ± 10		
65	30W0D ± 10		
66	30W3D ± 10		
67	31W0D ± 10		
68	31W3D ± 10		
69	32W0D ± 10		
70	32W3D ± 11		

Table 51. LV : Tokyo

BPD : Osaka Unit : BPD (mm) Age (Day) SD (Day)

BPD	Age	SD	BPD	Age	SD	BPD	Age	SD
13	10W0D	1.9	46	19W2D	2.8	79	30W4D	3.6
14	10W1D	1.9	47	19W4D	2.8	80	31W0D	3.6
15	10W3D	1.9	48	19W6D	2.8	81	31W3D	3.6
16	10W5D	1.9	49	20W1D	2.9	82	32W0D	3.6
17	11W0D	2.0	50	20W3D	2.9	83	32W3D	3.6
18	11W1D	2.0	51	20W5D	2.9	84	32W6D	3.7
19	11W3D	2.0	52	21W1D	2.9	85	33W3D	3.7
20	11W5D	2.1	53	21W3D	3.0	86	33W6D	3.7
21	12W0D	2.1	54	21W5D	3.0	87	34W0D	3.7
22	12W2D	2.1	55	22W0D	3.0	88	35W0D	3.7
23	12W4D	2.1	56	22W3D	3.0	89	35W4D	3.8
24	12W6D	2.2	57	22W5D	3.1	90	36W2D	3.8
25	13W1D	2.2	58	23W0D	3.1	91	37W0D	3.8
26	13W3D	2.2	59	23W3D	3.1	92	37W6D	3.8
27	13W5D	2.3	60	23W5D	3.1	93	39W0D	3.9
28	14W0D	2.3	61	24W0D	3.2	94	40W0D	3.9
29	14W1D	2.3	62	24W3D	3.2			
30	14W3D	2.3	63	24W5D	3.2			
31	14W5D	2.4	64	25W0D	3.2			
32	15W0D	2.4	65	25W3D	3.3			
33	15W2D	2.4	66	25W5D	3.3			
34	15W4D	2.5	67	26W0D	3.3			
35	16W0D	2.5	68	26W3D	3.3			
36	16W2D	2.5	69	26W5D	3.3			
37	16W4D	2.5	70	27W1D	3.4			
38	16W6D	2.6	71	27W4D	3.4			
39	17W1D	2.6	72	27W6D	3.4			
40	17W3D	2.6	73	28W2D	3.4			
41	17W5D	2.7	74	28W4D	3.5			
42	18W0D	2.7	75	29W0D	3.5			
43	18W2D	2.7	76	29W3D	3.5			
44	18W4D	2.7	77	29W6D	3.5			
45	18W6D	2.8	78	30W2D	3.5			

Table 52. BPD : Osaka

CRL : Osaka Unit : CRL (mm) Age (Day) SD (Day)

CRL	Age	SD	CRL	Age	SD
9	7W1D	1.7	43	11W1D	6.0
10	7W3D	2.0	44	11W2D	6.1
11	7W4D	2.2	45	11W2D	6.1
12	7W6D	2.5	46	11W3D	6.3
13	8W0D	2.6	47	11W3D	6.3
14	8W1D	2.8	48	11W4D	6.4
15	8W2D	2.9	49	11W5D	6.6
16	8W3D	3.1	50	11W6D	6.7
17	8W4D	3.2	51	11W6D	6.7
18	8W5D	3.4	52	11W6D	6.7
19	8W6D	3.5	53	12W0D	6.9
20	9W0D	3.7	54	12W1D	7.0
21	9W0D	3.7	55	12W1D	7.0
22	9W1D	3.8	56	12W2D	7.2
23	9W2D	4.0	57	12W2D	7.2
24	9W3D	4.1	58	12W3D	7.3
25	9W3D	4.1	59	12W3D	7.3
26	9W4D	4.3	60	12W4D	7.5
27	9W5D	4.5	61	12W5D	7.6
28	9W6D	4.6	62	12W5D	7.6
29	9W6D	4.6	63	12W6D	7.8
30	10W0D	4.8			
31	10W1D	4.9			
32	10W1D	4.9			
33	10W2D	5.1			
34	10W3D	5.2			
35	10W3D	5.2			
36	10W4D	5.4			
37	10W4D	5.4			
38	10W5D	5.5			
39	10W6D	5.7			
40	10W6D	5.7			
41	11W0D	5.8			
42	11W0D	5.8			

Table 53. CRL : Osaka

FL : Osaka Unit : FL (mm) Age (Day) SD (Day)

FL	Age	SD	FL	Age	SD
9	13W0D	2.1	44	25W3D	2.6
10	13W2D	2.1	45	25W6D	2.6
11	13W4D	2.1	46	26W2D	2.6
12	13W6D	2.2	47	26W4D	2.6
13	14W1D	2.2	48	27W1D	2.7
14	14W4D	2.2	49	27W4D	2.7
15	14W6D	2.2	50	28W0D	2.7
16	15W1D	2.2	51	28W3D	2.7
17	15W3D	2.2	52	28W6D	2.7
18	15W5D	2.2	53	29W2D	2.8
19	16W1D	2.2	54	29W6D	2.8
20	16W3D	2.3	55	30W2D	2.8
21	16W6D	2.3	56	30W6D	2.8
22	17W1D	2.3	57	31W3D	2.8
23	17W3D	2.3	58	31W6D	2.9
24	17W6D	2.3	59	32W3D	2.9
25	18W1D	2.3	60	32W6D	2.9
26	18W4D	2.3	61	33W4D	2.9
27	18W6D	2.3	62	34W1D	2.9
28	19W2D	2.4	63	34W4D	3.0
29	19W4D	2.4	64	35W2D	3.0
30	20W0D	2.4	65	35W5D	3.0
31	20W2D	2.4	66	36W3D	3.0
32	20W5D	2.4	67	36W6D	3.0
33	21W0D	2.4	68	37W1D	3.1
34	21W3D	2.4	69	38W3D	3.1
35	21W5D	2.5	70	39W1D	3.1
36	22W1D	2.5	71	39W6D	3.2
37	22W4D	2.5			
38	23W1D	2.5			
39	23W2D	2.5			
40	23W5D	2.5			
41	24W1D	2.6			
42	24W4D	2.6			
43	25W0D	2.6			

Table 54. FL : Osaka

HL : Osaka Unit : HL (mm) Age (Day) SD (Day)

HL	Age	SD	HL	Age	SD
10	13W0D	2.0	41	25W3D	2.4
11	13W2D	2.0	42	26W0D	2.4
12	13W5D	2.0	43	26W3D	2.5
13	14W0D	2.1	44	26W6D	2.5
14	14W2D	2.1	45	27W3D	2.5
15	14W5D	2.1	46	28W0D	2.5
16	15W0D	2.1	47	28W4D	2.5
17	15W3D	2.1	48	29W1D	2.5
18	15W5D	2.1	49	29W5D	2.6
19	16W1D	2.1	50	30W3D	2.6
20	16W3D	2.1	51	31W0D	2.6
21	16W5D	2.1	52	31W5D	2.6
22	17W2D	2.2	53	32W3D	2.6
23	17W4D	2.2	54	33W1D	2.7
24	18W0D	2.2	55	33W6D	2.7
25	18W3D	2.2	56	34W4D	2.7
26	18W6D	2.2	57	35W3D	2.8
27	19W1D	2.2	58	36W2D	2.8
28	19W4D	2.2	59	37W1D	2.8
29	20W0D	2.2	60	38W1D	2.9
30	20W3D	2.3	61	39W2D	2.9
31	20W5D	2.3	62	40W0D	2.9
32	21W2D	2.3			
33	21W4D	2.3			
34	22W1D	2.3			
35	22W4D	2.3			
36	23W0D	2.3			
37	23W3D	2.4			
38	23W6D	2.4			
39	24W2D	2.4			
40	24W6D	2.4			

Table 55. HL : Osaka

FTA : Osaka Unit : FTA (mm) Age (Day) SD(Day)

FTA	Age	SD	FTA	Age	SD	FTA	Age	SD
560	14W0D	120	3800	26W3D	450	7100	35W3D	820
600	14W2D	120	3900	26W5D	460	7200	35W5D	830
700	14W5D	130	4000	27W0D	470	7300	36W0D	840
800	15W3D	150	4100	27W2D	480	7400	36W2D	860
900	16W1D	160	4200	27W4D	490	7500	36W4D	870
1000	16W3D	170	4300	27W6D	500	7600	36W6D	880
1100	16W5D	170	4400	28W1D	510	7700	37W1D	900
1200	17W3D	190	4500	28W3D	520	7800	37W3D	910
1300	17W6D	200	4600	28W5D	530	7900	37W5D	930
1400	18W2D	210	4700	29W0D	540	8000	37W6D	930
1500	18W4D	220	4800	29W2D	560	8100	38W2D	960
1600	19W1D	230	4900	29W4D	570	8200	38W4D	970
1700	19W4D	240	5000	29W6D	580	8300	39W0D	990
1800	19W6D	250	5100	30W1D	590	8400	39W1D	1000
1900	20W2D	260	5200	30W3D	600	8500	39W3D	1010
2000	20W5D	270	5300	30W5D	610	8600	39W6D	1040
2100	21W0D	280	5400	30W6D	620	8660	40W0D	1040
2200	21W3D	290	5500	31W1D	630			
2300	21W5D	300	5600	31W3D	640			
2400	22W1D	310	5700	31W5D	650			
2500	22W3D	330	5800	32W0D	670			
2600	22W5D	330	5900	32W2D	680			
2700	23W1D	340	6000	32W3D	680			
2800	23W3D	350	6100	32W5D	700			
2900	23W5D	360	6200	33W0D	710			
3000	24W0D	370	6300	33W2D	720			
3100	24W2D	380	6400	33W4D	730			
3200	24W5D	390	6500	33W6D	750			
3300	25W0D	400	6600	34W0D	750			
3400	25W2D	410	6700	34W2D	760			
3500	25W4D	420	6800	34W4D	780			
3600	25W6D	430	6900	34W6D	790			
3700	26W1D	440	7000	35W1D	800			

Table 56. FTA : Osaka

EFBW : Osaka Unit : EFBW (gm) Age (W-Week, D-Day) SD(gm)

EFBW	Age	SD	EFBW	Age	SD	EFBW	Age	SD
137	16W0D	29	470	21W4D	66	810	24W5D	107
140	16W1D	29	480	21W5D	68	820	24W6D	108
150	16W3D	29	490	21W6D	69	830	24W6D	109
160	16W4D	30	500	21W6D	69	840	25W0D	110
170	16W6D	30	510	22W0D	71	850	25W0D	111
180	17W1D	31	520	22W1D	73	860	25W1D	112
190	17W2D	32	530	22W1D	73	870	25W1D	113
200	17W4D	33	540	22W2D	74	880	25W2D	114
210	17W5D	34	550	22W3D	76	890	25W2D	115
220	18W0D	35	560	22W3D	76	900	25W3D	116
230	18W1D	36	570	22W4D	78	910	25W3D	117
240	18W2D	37	580	22W5D	80	920	25W4D	118
250	18W4D	39	590	22W6D	81	930	25W4D	119
260	18W5D	40	600	22W6D	81	940	25W5D	120
270	18W6D	41	610	23W0D	83	950	25W5D	121
280	19W0D	42	620	23W1D	85	960	25W6D	123
290	19W1D	43	630	23W1D	85	970	25W6D	124
300	19W2D	44	640	23W2D	87	980	26W0D	125
310	19W3D	45	650	23W3D	89	990	26W0D	126
320	19W4D	46	660	23W3D	89	1000	26W1D	127
330	19W5D	48	670	23W4D	91	1010	26W2D	129
340	19W6D	49	680	23W4D	91	1020	26W3D	131
350	20W0D	50	690	23W5D	92	1030	26W3D	132
360	20W1D	51	700	23W6D	94	1040	26W4D	133
370	20W2D	53	710	23W6D	95	1050	26W4D	134
380	20W3D	54	720	24W0D	96	1060	26W5D	135
390	20W4D	56	730	24W0D	97	1070	26W5D	136
400	20W5D	57	740	24W1D	98	1080	26W6D	138
410	20W6D	58	750	24W1D	99	1090	26W6D	139
420	21W0D	60	760	24W2D	100	1100	27W0D	140
430	21W1D	61	770	24W2D	101	1110	27W0D	141
440	21W2D	63	780	24W3D	102	1120	27W1D	142
450	21W2D	63	790	24W4D	104	1130	27W1D	143
460	21W3D	65	800	24W5D	106	1140	27W2D	144

Table 57. EFBW : Osaka

EFBW : Osaka Unit : FTA (mm) Age (Day) SD(Day) (Cont'd)

EFBW	Age	SD	EFBW	Age	SD	EFBW	Age	SD
1150	27W2D	145	1490	29W3D	179	1830	31W3D	213
1160	27W3D	146	1500	29W4D	181	1840	31W4D	214
1170	27W3D	147	1510	29W4D	182	1850	31W4D	215
1180	27W4D	149	1520	29W5D	183	1860	31W5D	217
1190	27W4D	150	1530	29W5D	184	1870	31W5D	218
1200	27W5D	151	1540	29W6D	185	1880	31W6D	219
1210	27W5D	152	1550	29W6D	186	1890	31W6D	220
1220	27W6D	153	1560	30W0D	188	1900	32W0D	222
1230	27W6D	153	1570	30W0D	188	1910	32W0D	222
1240	27W6D	153	1580	30W0D	188	1920	32W0D	222
1250	27W6D	154	1590	30W0D	189	1930	32W0D	223
1260	28W0D	155	1600	30W1D	190	1940	32W1D	224
1270	28W0D	156	1610	30W1D	191	1950	32W1D	225
1280	28W1D	158	1620	30W2D	192	1960	32W2D	227
1290	28W1D	159	1630	30W2D	193	1970	32W2D	228
1300	28W2D	160	1640	30W3D	195	1980	32W3D	229
1310	28W2D	161	1650	30W3D	196	1990	32W3D	230
1320	28W3D	162	1660	30W4D	197	2000	32W4D	232
1330	28W3D	163	1670	30W4D	198	2010	32W4D	233
1340	28W4D	164	1680	30W5D	200	2020	32W5D	234
1350	28W4D	165	1690	30W5D	201	2030	32W5D	234
1360	28W5D	167	1700	30W6D	202	2040	32W5D	234
1370	28W5D	168	1710	30W6D	202	2050	32W5D	235
1380	28W6D	169	1720	30W6D	202	2060	32W6D	237
1390	28W6D	170	1730	30W6D	203	2070	32W6D	238
1400	29W0D	171	1740	31W0D	204	2080	33W0D	239
1410	29W0D	171	1750	31W0D	205	2090	33W0D	240
1420	29W0D	171	1760	31W1D	207	2100	33W1D	242
1430	29W0D	172	1770	31W1D	208	2110	33W1D	243
1440	29W1D	174	1780	31W2D	209	2120	33W2D	244
1450	29W1D	175	1790	31W2D	210	2130	33W2D	244
1460	29W2D	176	1800	31W3D	212	2140	33W2D	244
1470	29W2D	177	1810	31W3D	212	2150	33W2D	245
1480	29W3D	178	1820	31W3D	212	2160	33W3D	247

Table 46. EFBW : Osaka

EFBW : Osaka Unit : FTA (mm) Age (Day) SD(Day) (Cont'd)

EFBW	Age	SD	EFBW	Age	SD	EFBW	Age	SD
2170	33W3D	248	2510	35W3D	286	2850	37W3D	327
2180	33W4D	250	2520	35W4D	288	2860	37W4D	329
2190	33W4D	251	2530	35W4D	288	2870	37W4D	330
2200	33W5D	252	2540	35W4D	288	2880	37W5D	332
2210	33W5D	252	2550	35W4D	289	2890	37W5D	333
2220	33W5D	252	2560	35W5D	290	2900	37W6D	335
2230	33W5D	253	2570	35W5D	291	2910	37W6D	336
2240	33W6D	255	2580	35W6D	293	2920	38W0D	339
2250	33W6D	256	2590	35W6D	294	2930	38W0D	339
2260	34W0D	257	2600	36W0D	296	2940	38W0D	339
2270	34W0D	258	2610	36W0D	297	2950	38W0D	340
2280	34W1D	260	2620	36W1D	299	2960	38W1D	342
2290	34W1D	261	2630	36W1D	301	2970	38W1D	343
2300	34W2D	263	2640	36W2D	302	2980	38W2D	345
2310	34W2D	264	2650	36W2D	302	2990	38W2D	346
2320	34W3D	265	2660	36W2D	302	3000	38W3D	348
2330	34W3D	265	2670	36W2D	303	3010	38W3D	350
2340	34W3D	265	2680	36W3D	305	3020	38W4D	352
2350	34W3D	266	2690	36W3D	306	3030	38W4D	353
2360	34W4D	268	2700	36W4D	308	3040	38W5D	355
2370	34W4D	269	2710	36W4D	309	3050	38W5D	356
2380	34W5D	271	2720	36W5D	311	3060	38W6D	358
2390	34W5D	272	2730	36W5D	312	3070	38W6D	360
2400	34W6D	274	2740	36W6D	314	3080	39W0D	362
2410	34W6D	275	2750	36W6D	315	3090	39W0D	363
2420	35W0D	276	2760	37W0D	317	3100	39W1D	365
2430	35W0D	276	2770	37W0D	317	3110	39W1D	367
2440	35W0D	276	2780	37W0D	317	3120	39W2D	369
2450	35W0D	277	2790	37W0D	318	3130	39W2D	370
2460	35W1D	279	2800	37W1D	320	3140	39W3D	372
2470	35W1D	280	2810	37W1D	321	3150	39W3D	374
2480	35W2D	282	2820	37W2D	323	3160	39W4D	376
2490	35W2D	283	2830	37W2D	324	3170	39W4D	378
2500	35W3D	285	2840	37W3D	326	3180	39W5D	379

Table 46. EFBW : Osaka

EFBW : Osaka Unit : FTA (mm) Age (Day) SD(Day) (Cont'd)

EFBW	Age	SD
3190	39W5D	381
3200	39W6D	383
3210	39W6D	385
3220	40W0D	387

Table 46. EFBW : Osaka

BPD : Hadlock Hadlock, JUM, 1:97,1984 Unit :BPD (mm) Age (Week) SD (Days)

BPD	Age	BPD	Age	BPD	Age
14	11W6D ± 8	44	19W2D ± 12	74	29W4D ± 15
15	12W0D ± 8	45	19W4D ± 12	75	30W0D ± 21
16	12W2D ± 8	46	19W6D ± 12	76	30W3D ± 21
17	12W3D ± 8	47	20W1D ± 12	77	30W6D ± 21
18	12W5D ± 8	48	20W3D ± 12	78	31W2D ± 21
19	12W6D ± 8	49	20W5D ± 12	79	31W4D ± 21
20	13W1D ± 8	50	21W0D ± 12	80	32W0D ± 21
21	13W2D ± 8	51	21W3D ± 12	81	32W3D ± 21
22	13W4D ± 8	52	21W5D ± 12	82	32W6D ± 21
23	13W5D ± 8	53	22W0D ± 12	83	33W2D ± 21
24	14W0D ± 8	54	22W3D ± 12	84	33W5D ± 21
25	14W2D ± 8	55	22W5D ± 12	85	34W1D ± 21
26	14W3D ± 8	56	23W0D ± 12	86	34W4D ± 21
27	14W5D ± 8	57	23W3D ± 12	87	35W0D ± 21
28	15W0D ± 8	58	23W5D ± 12	88	35W3D ± 21
29	15W1D ± 8	59	24W0D ± 15	89	36W0D ± 22
30	15W3D ± 8	60	24W3D ± 15	90	36W3D ± 22
31	15W5D ± 8	61	24W5D ± 15	91	36W6D ± 22
32	16W0D ± 8	62	25W1D ± 15	92	37W2D ± 22
33	16W1D ± 8	63	25W3D ± 15	93	37W5D ± 22
34	16W3D ± 8	64	25W6D ± 15	94	38W1D ± 22
35	16W5D ± 8	65	26W1D ± 15	95	38W5D ± 22
36	17W0D ± 8	66	26W4D ± 15	96	39W1D ± 22
37	17W2D ± 8	67	26W6D ± 15	97	39W4D ± 22
38	17W4D ± 8	68	27W2D ± 15	98	40W1D ± 22
39	17W6D ± 8	69	27W5D ± 15	99	40W4D ± 22
40	18W1D ± 12	70	28W0D ± 15	100	41W0D ± 22
41	18W3D ± 12	71	28W3D ± 15	101	41W4D ± 22
42	18W5D ± 12	72	28W6D ± 15	102	42W0D ± 22
43	19W0D ± 12	73	29W2D ± 15	103	42W4D ± 22

Table 58. BPD : Hadlock

CRL : Hadlock Hadlock, AJR, 138:875,1982 Unit:CRL (mm) Age(Week) SD (Week)

CRL	Age	CRL	Age	CRL	Age	CRL	Age
2	5W5D ± 2	38	10W5D ± 4	74	13W4D ± 4	110	16W6D ± 6
3	5W6D ± 2	39	10W6D ± 4	75	13W4D ± 4	111	17W0D ± 6
4	6W1D ± 2	40	10W6D ± 4	76	13W5D ± 4	112	17W1D ± 6
5	6W1D ± 2	41	11W0D ± 4	77	13W6D ± 4	113	17W1D ± 6
6	6W3D ± 2	42	11W1D ± 4	78	13W6D ± 4	114	17W2D ± 6
7	6W4D ± 2	43	11W1D ± 4	79	13W6D ± 4	115	17W3D ± 6
8	6W5D ± 2	44	11W1D ± 4	80	14W0D ± 4	116	17W4D ± 6
9	6W6D ± 2	45	11W2D ± 4	81	14W1D ± 4	117	17W4D ± 6
10	7W1D ± 2	46	11W3D ± 4	82	14W1D ± 4	118	17W5D ± 6
11	7W1D ± 2	47	11W4D ± 4	83	14W1D ± 4	119	17W6D ± 6
12	7W3D ± 2	48	11W4D ± 4	84	14W2D ± 4	120	17W6D ± 6
13	7W4D ± 2	49	11W5D ± 4	85	14W3D ± 4	121	18W0D ± 6
14	7W5D ± 2	50	11W5D ± 4	86	14W4D ± 4		
15	7W6D ± 3	51	11W6D ± 4	87	14W4D ± 4		
16	8W0D ± 3	52	11W6D ± 4	88	14W5D ± 5		
17	8W1D ± 3	53	12W0D ± 4	89	14W6D ± 5		
18	8W2D ± 3	54	12W0D ± 4	90	14W6D ± 5		
19	8W3D ± 3	55	12W1D ± 4	91	15W0D ± 5		
20	8W4D ± 3	56	12W1D ± 4	92	15W1D ± 5		
21	8W5D ± 3	57	12W2D ± 4	93	15W1D ± 5		
22	8W6D ± 3	58	12W2D ± 4	94	15W2D ± 5		
23	9W0D ± 3	59	12W3D ± 4	95	15W2D ± 5		
24	9W1D ± 3	60	12W4D ± 4	96	15W3D ± 5		
25	9W1D ± 3	61	12W4D ± 4	97	15W4D ± 5		
26	9W3D ± 3	62	12W4D ± 4	98	15W4D ± 5		
27	9W4D ± 3	63	12W5D ± 4	99	15W5D ± 5		
28	9W4D ± 3	64	12W6D ± 4	100	15W6D ± 5		
29	9W5D ± 3	65	12W6D ± 4	101	16W0D ± 5		
30	9W6D ± 3	66	12W6D ± 4	102	16W1D ± 5		
31	10W0D ± 3	67	13W0D ± 4	103	16W1D ± 5		
32	10W1D ± 4	68	13W1D ± 4	104	16W2D ± 5		
33	10W1D ± 4	69	13W1D ± 4	105	16W3D ± 5		
34	10W2D ± 4	70	13W1D ± 4	106	16W4D ± 5		
36	10W4D ± 4	72	13W3D ± 4	108	16W5D ± 5		

Table 59. CRL : Hadlock

FL : Hadlock Hadlock, AJR, 138: 875,1984 Unit :FL (mm) Age (Week) SD (Days)

FL	Age	FL	Age	FL	Age
6	11W6D ± 9	35	21W0D ± 12	64	33W0D ± 20
7	12W1D ± 9	36	21W2D ± 12	65	33W3D ± 20
8	12W3D ± 9	37	21W5D ± 12	66	33W6D ± 20
9	12W4D ± 9	38	22W1D ± 12	67	34W3D ± 20
10	12W6D ± 9	39	22W3D ± 12	68	34W6D ± 20
11	13W1D ± 9	40	22W6D ± 12	69	35W2D ± 20
12	13W3D ± 9	41	23W2D ± 12	70	35W6D ± 20
13	13W5D ± 9	42	23W4D ± 12	71	36W2D ± 21
14	14W0D ± 9	43	24W0D ± 14	72	36W6D ± 21
15	14W2D ± 9	44	24W3D ± 14	73	37W2D ± 21
16	14W5D ± 9	45	24W6D ± 14	74	37W6D ± 21
17	15W0D ± 9	46	25W1D ± 14	75	38W2D ± 21
18	15W2D ± 9	47	25W4D ± 14	76	38W6D ± 21
19	15W4D ± 9	48	26W0D ± 14	77	39W2D ± 21
20	15W6D ± 9	49	26W3D ± 14	78	39W6D ± 21
21	16W1D ± 9	50	26W6D ± 14	79	40W2D ± 21
22	16W4D ± 9	51	27W2D ± 14	80	40W6D ± 21
23	16W6D ± 9	52	27W5D ± 14	81	41W3D ± 21
24	17W1D ± 9	53	28W1D ± 14	82	41W6D ± 21
25	17W3D ± 9	54	28W4D ± 14	83	42W3D ± 21
26	17W6D ± 9	55	29W0D ± 14		
27	18W1D ± 12	56	29W3D ± 14		
28	18W3D ± 12	57	29W6D ± 14		
29	18W6D ± 12	58	30W2D ± 20		
30	19W1D ± 12	59	30W5D ± 20		
31	19W4D ± 12	60	31W1D ± 20		
32	19W6D ± 12	61	31W4D ± 20		
33	20W2D ± 12	62	32W0D ± 20		
34	20W4D ± 12	63	32W4D ± 20		

Table 60. FL : Hadlock

AC : Hadlock Hadlock, AJR, 139:367,1982 Unit AC (mm) Age (Week) SD (Week)

AC	Age	AC	Age	AC	Age
50	12W0D ± 11	165	21W3D ± 14	270	31W0D ± 20
55	12W2D ± 11	170	21W6D ± 14	275	31W3D ± 20
60	12W5D ± 11	175	22W2D ± 14	280	32W0D ± 20
65	13W1D ± 11	180	22W6D ± 14	285	32W3D ± 20
70	13W4D ± 11	185	23W2D ± 14	290	33W0D ± 20
75	13W6D ± 11	190	23W5D ± 14	295	33W3D ± 20
80	14W2D ± 11	192	23W6D ± 14	300	33W6D ± 20
85	14W5D ± 11	193	24W0D ± 15	305	34W3D ± 20
90	15W1D ± 11	195	24W1D ± 15	310	34W6D ± 20
95	15W4D ± 11	200	24W4D ± 15	315	35W3D ± 20
100	16W0D ± 11	205	25W0D ± 15	320	35W6D ± 20
105	16W3D ± 11	210	25W3D ± 15	321	36W0D ± 21
110	16W6D ± 11	215	25W6D ± 15	325	36W2D ± 21
115	17W1D ± 11	220	26W3D ± 15	330	36W6D ± 21
120	17W4D ± 11	225	26W6D ± 15	335	37W2D ± 21
123	17W6D ± 11	230	27W2D ± 15	340	37W6D ± 21
124	18W0D ± 14	235	27W5D ± 15	345	38W2D ± 21
125	18W0D ± 14	240	28W2D ± 15	350	38W6D ± 21
130	18W3D ± 14	245	28W5D ± 15	355	39W2D ± 21
135	18W6D ± 14	250	29W1D ± 15	360	39W6D ± 21
140	19W2D ± 14	255	29W4D ± 15	365	40W2D ± 21
145	19W5D ± 14	258	29W6D ± 15	370	40W6D ± 21
150	20W1D ± 14	259	30W0D ± 20	375	41W3D ± 21
155	20W4D ± 14	260	30W1D ± 20	380	41W6D ± 21
160	21W0D ± 14	265	30W4D ± 20	385	42W3D ± 21

Table 61. AC : Hadlock

HC : Hadlock Hadlock AJR, 138: 649,1982 Unit:HC (mm) Age (Week) SD (Week)

HC	Age	HC	Age	HC	Age
55	11W6D ± 8	160	18W5D ± 10	265	28W5D ± 14
60	12W1D ± 8	165	19W1D ± 10	270	29W3D ± 14
65	12W3D ± 8	170	19W4D ± 10	274	29W6D ± 14
70	12W5D ± 8	175	20W0D ± 10	275	30W0D ± 20
75	13W0D ± 8	180	20W3D ± 10	280	30W4D ± 20
80	13W3D ± 8	185	20W5D ± 10	285	31W2D ± 20
85	13W5D ± 8	190	21W1D ± 10	290	31W6D ± 20
90	14W0D ± 8	195	21W4D ± 10	295	32W4D ± 20
95	14W2D ± 8	200	22W1D ± 10	300	33W1D ± 20
100	14W4D ± 8	205	22W4D ± 10	305	33W6D ± 20
105	14W6D ± 8	210	23W0D ± 10	310	34W4D ± 20
110	15W2D ± 8	215	23W3D ± 10	315	35W2D ± 20
115	15W4D ± 8	219	23W6D ± 10	319	35W6D ± 20
120	15W6D ± 8	220	24W0D ± 14	320	36W0D ± 18
125	16W2D ± 8	225	24W3D ± 14	325	36W5D ± 18
130	16W4D ± 8	230	25W0D ± 14	330	37W3D ± 18
135	16W6D ± 8	235	25W3D ± 14	335	38W2D ± 18
140	17W2D ± 8	240	26W0D ± 14	340	39W0D ± 18
145	17W4D ± 8	245	26W4D ± 14	345	39W6D ± 18
149	18W0D ± 8	250	27W1D ± 14	350	40W5D ± 18
150	18W0D ± 10	255	27W4D ± 14	355	41W3D ± 18
155	18W3D ± 10	260	28W1D ± 14	360	42W2D ± 18

Table 62. HC : Hadlock

EFW : Hadlock Unit : EFW (mm) Age (Week) SD (mm)

EFW	Age	SD	EFW	Age	SD	EFW	Age	SD
137	16W0D	29	470	21W4D	66	810	24W5D	107
140	16W1D	29	480	21W5D	68	820	24W6D	108
150	16W3D	29	490	21W6D	69	830	24W6D	109
160	16W4D	30	500	21W6D	69	840	25W0D	110
170	16W6D	30	510	22W0D	71	850	25W0D	111
180	17W1D	31	520	22W1D	73	860	25W1D	112
190	17W2D	32	530	22W1D	73	870	25W1D	113
200	17W4D	33	540	22W2D	74	880	25W2D	114
210	17W5D	34	550	22W3D	76	890	25W2D	115
220	18W0D	35	560	22W3D	76	900	25W3D	116
230	18W1D	36	570	22W4D	78	910	25W3D	117
240	18W2D	37	580	22W5D	80	920	25W4D	118
250	18W4D	39	590	22W6D	81	930	25W4D	119
260	18W5D	40	600	22W6D	81	940	25W5D	120
270	18W6D	41	610	23W0D	83	950	25W5D	121
280	19W0D	42	620	23W1D	85	960	25W6D	123
290	19W1D	43	630	23W1D	85	970	25W6D	124
300	19W2D	44	640	23W2D	87	980	26W0D	125
310	19W3D	45	650	23W3D	89	990	26W0D	126
320	19W4D	46	660	23W3D	89	1000	26W1D	127
330	19W5D	48	670	23W4D	91	1010	26W2D	129
340	19W6D	49	680	23W4D	91	1020	26W3D	131
350	20W0D	50	690	23W5D	92	1030	26W3D	132
360	20W1D	51	700	23W6D	94	1040	26W4D	133
370	20W2D	53	710	23W6D	95	1050	26W4D	134
380	20W3D	54	720	24W0D	96	1060	26W5D	135
390	20W4D	56	730	24W0D	97	1070	26W5D	136
400	20W5D	57	740	24W1D	98	1080	26W6D	138
410	20W6D	58	750	24W1D	99	1090	26W6D	139
420	21W0D	60	760	24W2D	100	1100	27W0D	140
430	21W1D	61	770	24W2D	101	1110	27W0D	141
440	21W2D	63	780	24W3D	102	1120	27W1D	142
450	21W2D	63	790	24W4D	104	1130	27W1D	143
460	21W3D	65	800	24W5D	106	1140	27W2D	144

Table 63. EFW : Hadlock

EFW : Hadlock Unit : EFW (mm) Age (Week) SD (mm) (Cont'd)

EFW	Age	SD	EFW	Age	SD	EFW	Age	SD
1150	27W2D	145	1490	29W3D	179	1830	31W3D	213
1160	27W3D	146	1500	29W4D	181	1840	31W4D	214
1170	27W3D	147	1510	29W4D	182	1850	31W4D	215
1180	27W4D	149	1520	29W5D	183	1860	31W5D	217
1190	27W4D	150	1530	29W5D	184	1870	31W5D	218
1200	27W5D	151	1540	29W6D	185	1880	31W6D	219
1210	27W5D	152	1550	29W6D	186	1890	31W6D	220
1220	27W6D	153	1560	30W0D	188	1900	32W0D	222
1230	27W6D	153	1570	30W0D	188	1910	32W0D	222
1240	27W6D	153	1580	30W0D	188	1920	32W0D	222
1250	27W6D	154	1590	30W0D	189	1930	32W0D	223
1260	28W0D	155	1600	30W1D	190	1940	32W1D	224
1270	28W0D	156	1610	30W1D	191	1950	32W1D	225
1280	28W1D	158	1620	30W2D	192	1960	32W2D	227
1290	28W1D	159	1630	30W2D	193	1970	32W2D	228
1300	28W2D	160	1640	30W3D	195	1980	32W3D	229
1310	28W2D	161	1650	30W3D	196	1990	32W3D	230
1320	28W3D	162	1660	30W4D	197	2000	32W4D	232
1330	28W3D	163	1670	30W4D	198	2010	32W4D	233
1340	28W4D	164	1680	30W5D	200	2020	32W5D	234
1350	28W4D	165	1690	30W5D	201	2030	32W5D	234
1360	28W5D	167	1700	30W6D	202	2040	32W5D	234
1370	28W5D	168	1710	30W6D	202	2050	32W5D	235
1380	28W6D	169	1720	30W6D	202	2060	32W6D	237
1390	28W6D	170	1730	30W6D	203	2070	32W6D	238
1400	29W0D	171	1740	31W0D	204	2080	33W0D	239
1410	29W0D	171	1750	31W0D	205	2090	33W0D	240
1420	29W0D	171	1760	31W1D	207	2100	33W1D	242
1430	29W0D	172	1770	31W1D	208	2110	33W1D	243
1440	29W1D	174	1780	31W2D	209	2120	33W2D	244
1450	29W1D	175	1790	31W2D	210	2130	33W2D	244
1460	29W2D	176	1800	31W3D	212	2140	33W2D	244
1470	29W2D	177	1810	31W3D	212	2150	33W2D	245
1480	29W3D	178	1820	31W3D	212	2160	33W3D	247

Table 52. EFW : Hadlock

EFW : Hadlock Unit : EFW (mm) Age (Week) SD (mm) (Cont'd)

EFW	Age	SD	EFW	Age	SD	EFW	Age	SD
2170	33W3D	248	2510	35W3D	286	2850	37W3D	327
2180	33W4D	250	2520	35W4D	288	2860	37W4D	329
2190	33W4D	251	2530	35W4D	288	2870	37W4D	330
2200	33W5D	252	2540	35W4D	288	2880	37W5D	332
2210	33W5D	252	2550	35W4D	289	2890	37W5D	333
2220	33W5D	252	2560	35W5D	290	2900	37W6D	335
2230	33W5D	253	2570	35W5D	291	2910	37W6D	336
2240	33W6D	255	2580	35W6D	293	2920	38W0D	339
2250	33W6D	256	2590	35W6D	294	2930	38W0D	339
2260	34W0D	257	2600	36W0D	296	2940	38W0D	339
2270	34W0D	258	2610	36W0D	297	2950	38W0D	340
2280	34W1D	260	2620	36W1D	299	2960	38W1D	342
2290	34W1D	261	2630	36W1D	301	2970	38W1D	343
2300	34W2D	263	2640	36W2D	302	2980	38W2D	345
2310	34W2D	264	2650	36W2D	302	2990	38W2D	346
2320	34W3D	265	2660	36W2D	302	3000	38W3D	348
2330	34W3D	265	2670	36W2D	303	3010	38W3D	350
2340	34W3D	265	2680	36W3D	305	3020	38W4D	352
2350	34W3D	266	2690	36W3D	306	3030	38W4D	353
2360	34W4D	268	2700	36W4D	308	3040	38W5D	355
2370	34W4D	269	2710	36W4D	309	3050	38W5D	356
2380	34W5D	271	2720	36W5D	311	3060	38W6D	358
2390	34W5D	272	2730	36W5D	312	3070	38W6D	360
2400	34W6D	274	2740	36W6D	314	3080	39W0D	362
2410	34W6D	275	2750	36W6D	315	3090	39W0D	363
2420	35W0D	276	2760	37W0D	317	3100	39W1D	365
2430	35W0D	276	2770	37W0D	317	3110	39W1D	367
2440	35W0D	276	2780	37W0D	317	3120	39W2D	369
2450	35W0D	277	2790	37W0D	318	3130	39W2D	370
2460	35W1D	279	2800	37W1D	320	3140	39W3D	372
2470	35W1D	280	2810	37W1D	321	3150	39W3D	374
2480	35W2D	282	2820	37W2D	323	3160	39W4D	376
2490	35W2D	283	2830	37W2D	324	3170	39W4D	378
2500	35W3D	285	2840	37W3D	326	3180	39W5D	379

Table 52. EFW : Hadlock

EFW : Hadlock Unit : EFW (mm) Age (Week) SD (mm) (Cont'd)

EFW	GA	SD
3190	39W5D	381
3200	39W6D	383
3210	39W6D	385
3220	40W0D	387

Table 52. EFW : Hadlock

AC : Hansmann Unit : AC (mm) Age (Weeks/Days) SD (mm)
Hansmann : M and Al : Geburtsh, u, Frauenheik 39 :656,1979

AC	Age	SD	AC	Age	SD
53	11W0D	22	205	26W2D	22
55	11W1D	22	210	26W6D	22
60	11W4D	22	215	27W3D	22
65	12W0D	22	220	27W6D	22
70	12W3D	22	225	28W3D	22
75	13W0D	22	230	29W0D	22
80	13W3D	22	235	29W3D	22
85	13W6D	22	240	30W0D	22
90	14W2D	22	245	30W4D	22
95	14W5D	22	250	31W1D	22
100	15W2D	22	255	31W4D	22
105	15W5D	22	260	32W1D	22
110	16W2D	22	265	32W5D	22
115	16W6D	22	270	33W1D	22
120	17W2D	22	275	33W5D	22
125	17W6D	22	280	34W2D	22
130	18W3D	22	285	34W5D	22
135	19W0D	22	290	35W2D	22
140	19W3D	22	295	35W6D	22
145	20W0D	22	300	36W3D	22
150	20W4D	22	305	37W0D	22
155	21W0D	22	310	37W5D	22
160	21W4D	22	315	38W2D	22
165	22W1D	22	320	39W0D	22
170	22W4D	22			
175	23W1D	22			
180	23W5D	22			
185	24W2D	22			
190	24W5D	22			
195	25W2D	22			
200	25W6D	22			

Table 64. AC : Hansmann

BPD : Hansmann Unit : BPD (mm) Age (Weeks/Days) 2SD=mm

BPD	Age	SD	BPD	Age	SD	BPD	Age	SD
20	11W2D	4	55	21W1D	5	90	34W2D	5
21	11W3D	4	56	21W3D	5	91	34W5D	5
22	11W5D	4	57	21W5D	5	92	35W2D	5
23	12W0D	4	58	22W0D	5	93	35W6D	5
24	12W2D	4	59	22W3D	5	94	36W3D	5
25	12W4D	4	60	22W5D	5	95	37W1D	5
26	12W6D	4	61	23W0D	5	96	37W6D	5
27	13W1D	4	62	23W2D	5	97	38W3D	5
28	13W3D	4	63	23W5D	5	98	39W1D	5
29	13W5D	4	64	24W0D	5	99	39W6D	5
30	14W0D	4	65	24W2D	5			
31	14W2D	4	66	24W4D	5			
32	14W4D	4	67	25W0D	5			
33	14W6D	4	68	25W2D	5			
34	15W1D	4	69	25W4D	5			
35	15W3D	4	70	25W6D	5			
36	15W5D	4	71	26W2D	5			
37	16W0D	4	72	26W4D	5			
38	16W2D	4	73	26W6D	5			
39	16W4D	4	74	27W2D	5			
40	16W6D	4	75	27W4D	5			
41	17W1D	4	76	28W0D	5			
42	17W3D	4	77	28W3D	5			
43	17W5D	4	78	28W6D	5			
44	18W0D	4	79	29W2D	5			
45	18W2D	4	80	29W4D	5			
46	18W4D	4	81	30W0D	5			
47	18W6D	4	82	30W3D	5			
48	19W1D	4	83	30W6D	5			
49	19W3D	4	84	31W2D	5			
50	19W5D	4	85	31W5D	5			
51	20W0D	4	86	32W1D	5			
52	20W2D	4	87	32W5D	5			
53	20W4D	4	88	33W1D	5			
54	20W6D	5	89	33W5D	5			

Table 65. BPD : Hansmann

CRL : Hansmann Unit : CRL (mm) Age (Weeks/Days) 2SD=mm

CRL	Age	SD	CRL	Age	SD	CRL	Age	SD
47	11W4D	7	81	14W2D	7	115	17W2D	7
48	11W4D	7	82	14W2D	7	116	17W2D	7
49	11W5D	7	83	14W3D	7	117	17W3D	7
50	11W5D	7	84	14W3D	7	118	17W4D	7
51	11W6D	7	85	14W4D	7	119	17W4D	7
52	11W6D	7	86	14W4D	7	120	17W5D	7
53	12W0D	7	87	14W5D	7	121	17W6D	7
54	12W0D	7	88	14W5D	7	122	17W6D	7
55	12W1D	7	89	14W6D	7	123	18W0D	7
56	12W2D	7	90	15W0D	7	124	18W1D	7
57	12W2D	7	91	15W0D	7	125	18W1D	7
58	12W3D	7	92	15W1D	7	126	18W2D	7
59	12W3D	7	93	15W1D	7	127	18W3D	7
60	12W4D	7	94	15W2D	7	128	18W3D	7
61	12W4D	7	95	15W2D	7	129	18W4D	7
62	12W5D	7	96	15W3D	7	130	18W5D	7
63	12W5D	7	97	15W4D	7	131	18W5D	7
64	12W6D	7	98	15W4D	7	132	18W6D	7
65	13W0D	7	99	15W5D	7	133	19W0D	7
66	13W0D	7	100	15W6D	7	134	19W1D	7
67	13W1D	7	101	15W6D	7	135	19W2D	7
68	13W1D	7	102	16W0D	7	136	19W2D	7
69	13W2D	7	103	16W1D	7	137	19W3D	7
70	13W2D	7	104	16W1D	7	138	19W4D	7
71	13W3D	7	105	16W2D	7	139	19W5D	7
72	13W4D	7	106	16W3D	7	140	19W6D	7
73	13W4D	7	107	16W3D	7			
74	13W5D	7	108	16W4D	7			
75	13W5D	7	109	16W5D	7			
76	13W6D	7	110	16W5D	7			
77	13W6D	7	111	16W6D	7			
78	14W0D	7	112	17W0D	7			
79	14W0D	7	113	17W0D	7			
80	14W1D	7	114	17W1D	7			

Table 66. CRL : Hansmann

FL : Hansmann Unit : FL (mm) Age (Weeks/Days) 2SD=mm

FL	Age	SD	FL	Age	SD
10	12W3D	4	43	24W3D	5
11	13W2D	4	44	24W5D	5
12	14W1D	5	45	25W1D	5
13	14W3D	5	46	25W4D	5
14	14W5D	5	47	25W6D	5
15	15W0D	5	48	26W2D	5
16	15W2D	5	49	26W5D	5
17	15W4D	5	50	27W1D	5
18	15W6D	5	51	27W4D	5
19	16W1D	5	52	28W0D	5
20	16W3D	5	53	28W3D	5
21	16W5D	5	54	28W6D	5
22	17W0D	5	55	29W2D	5
23	17W2D	5	56	29W5D	5
24	17W4D	5	57	30W1D	5
25	17W6D	5	58	30W4D	5
26	18W1D	5	59	31W0D	5
27	18W3D	5	60	31W3D	5
28	18W6D	5	61	31W6D	5
29	19W1D	5	62	32W2D	5
30	19W4D	5	63	32W5D	5
31	19W6D	5	64	33W1D	5
32	20W2D	5	65	33W5D	5
33	20W5D	5	66	34W2D	5
34	21W0D	5	67	34W6D	5
35	21W3D	5	68	35W3D	5
36	21W5D	5	69	36W1D	5
37	22W1D	5	70	36W5D	5
38	22W4D	5	71	37W2D	5
39	22W6D	5	72	38W0D	5
40	23W2D	5	73	38W4D	5
41	23W5D	5	74	39W1D	5
42	24W0D	5	75	39W6D	5

Table 67. FL : Hansmann

GS : Hansmann Unit : GS (mm) Age (Weeks/Days) 2SD=mm
Hansmann : M and Al : Geburtsh, u, Frauenheilk 39 : 656, 1979

GS	Age	SD	GS	Age	SD
10	4W5D	5	41	9W0D	5
11	4W6D	5	42	9W1D	5
12	5W0D	5	43	9W2D	5
13	5W1D	5	44	9W3D	5
14	5W2D	5	45	9W4D	5
15	5W3D	5	46	9W5D	5
16	5W4D	5	47	9W6D	5
17	5W5D	5	48	10W0D	5
18	5W6D	5	49	10W1D	5
19	6W0D	5	50	10W2D	5
20	6W1D	5	51	10W3D	5
21	6W2D	5	52	10W4D	5
22	6W3D	5	53	10W5D	5
23	6W4D	5	54	10W6D	5
24	6W5D	5	55	11W0D	5
25	6W6D	5	56	11W1D	5
26	7W0D	5	57	11W2D	5
27	7W1D	5	58	11W3D	5
28	7W2D	5	59	11W4D	5
29	7W3D	5	60	11W5D	5
30	7W4D	5	61	11W6D	5
31	7W5D	5	62	12W0D	5
32	7W6D	5	63	12W1D	5
33	8W0D	5	64	12W2D	5
34	8W1D	5	65	12W3D	5
35	8W2D	5			
36	8W2D	5			
37	8W3D	5			
38	8W4D	5			
39	8W5D	5			
40	8W6D	5			

Table 68. GS : Hansmann

HC : Hansmann Unit : HC (mm) Age (Weeks/Days) 2SD=mm

HC	Age	SD	HC	Age	SD
106	13W0D	15	275	27W0D	18
110	13W2D	15	280	27W3D	18
115	13W5D	15	285	28W0D	19
120	14W1D	15	290	28W4D	20
125	14W5D	16	295	29W1D	20
130	15W1D	16	300	29W5D	21
135	15W4D	16	305	30W3D	22
140	16W0D	17	310	31W0D	22
145	16W3D	17	315	31W5D	22
150	17W0D	18	320	32W2D	22
155	17W2D	18	325	33W0D	22
160	17W5D	18	330	34W0D	22
165	18W1D	18	335	35W0D	22
170	18W3D	18	340	36W0D	22
175	18W6D	18	345	37W4D	22
180	19W2D	18	349	39W0D	22
185	19W5D	18			
190	20W0D	18			
195	20W3D	18			
200	20W6D	18			
205	21W1D	18			
210	21W4D	18			
215	22W0D	18			
220	22W3D	18			
225	22W5D	18			
230	23W1D	18			
235	23W4D	18			
240	24W0D	18			
245	24W3D	18			
250	24W6D	18			
255	25W2D	18			
260	25W5D	18			
265	26W1D	18			
270	26W4D	18			

Table 69. HC : Hansmann

OFD : Hansmann Unit : OFD (mm) Age (Weeks/Days) 2SD=mm

OFD	Age	SD	OFD	Age	SD	OFD	Age	SD
31	13W0D	0	66	20W4D	0	101	30W3D	0
32	13W1D	0	67	20W6D	0	102	30W6D	0
33	13W3D	0	68	21W1D	0	103	31W2D	0
34	13W4D	0	69	21W2D	0	104	31W5D	0
35	13W6D	0	70	21W4D	0	105	32W1D	0
36	14W0D	0	71	21W5D	0	106	32W4D	0
37	14W2D	0	72	22W0D	0	107	33W0D	0
38	14W3D	0	73	22W2D	0	108	33W4D	0
39	14W5D	0	74	22W3D	0	109	34W1D	0
40	14W6D	0	75	22W5D	0	110	34W5D	0
41	15W1D	0	76	23W0D	0	111	35W2D	0
42	15W2D	0	77	23W1D	0	112	36W0D	0
43	15W4D	0	78	23W3D	0	113	37W0D	12
44	15W5D	0	79	23W5D	0	114	38W0D	25
45	16W0D	0	80	24W0D	0	115	39W0D	38
46	16W1D	0	81	24W2D	0			
47	16W3D	0	82	24W4D	0			
48	16W4D	0	83	24W6D	0			
49	16W6D	0	84	25W0D	0			
50	17W0D	0	85	25W2D	0			
51	17W1D	0	86	25W4D	0			
52	17W3D	0	87	25W6D	0			
53	17W4D	0	88	26W1D	0			
54	17W6D	0	89	26W3D	0			
55	18W1D	0	90	26W5D	0			
56	18W2D	0	91	27W0D	0			
57	18W4D	0	92	27W2D	0			
58	18W5D	0	93	27W4D	0			
59	19W0D	0	94	28W0D	0			
60	19W2D	0	95	28W2D	0			
61	19W3D	0	96	28W4D	0			
62	19W5D	0	97	29W0D	0			
63	20W0D	0	98	29W2D	0			
64	20W1D	0	99	29W4D	0			
65	20W3D	0	100	30W0D	0			

Table 70. OFD : Hansmann

TAD : Hansmann Unit : TAD (mm) Age (Weeks/Days) 2SD=mm
Hansmann : M and Al : Geburtsh, u, Frauenheilk

TAD	Age	SD	TAD	Age	SD	TAD	Age	SD
20	12W3D	4	55	23W0D	4	90	35W0D	5
21	12W5D	4	56	23W3D	4	91	35W2D	5
22	13W0D	4	57	23W5D	4	92	35W5D	5
23	13W2D	4	58	24W0D	4	93	36W0D	5
24	13W4D	4	59	24W2D	4	94	36W3D	5
25	13W6D	4	60	24W5D	4	95	36W6D	5
26	14W1D	4	61	25W0D	4	96	37W2D	5
27	14W3D	4	62	25W2D	4	97	37W5D	5
28	14W5D	4	63	25W4D	4	98	38W1D	5
29	15W0D	4	64	26W0D	4	99	38W4D	5
30	15W2D	4	65	26W2D	4	100	39W0D	5
31	15W4D	4	66	26W4D	4	101	39W3D	5
32	15W6D	4	67	26W6D	4	102	39W6D	5
33	16W1D	4	68	27W2D	5	103	40W2D	5
34	16W3D	4	69	27W4D	5			
35	16W5D	4	70	27W6D	5			
36	17W0D	4	71	28W2D	5			
37	17W3D	4	72	28W4D	5			
38	17W5D	4	73	29W0D	5			
39	18W0D	4	74	29W2D	5			
40	18W2D	4	75	29W5D	5			
41	18W4D	4	76	30W0D	5			
42	18W6D	4	77	30W2D	5			
43	19W2D	4	78	30W5D	5			
44	19W4D	4	79	31W0D	5			
45	19W6D	4	80	31W3D	5			
46	20W1D	4	81	31W5D	5			
47	20W3D	4	82	32W1D	5			
48	20W6D	4	83	32W3D	5			
49	21W1D	4	84	32W6D	5			
50	21W3D	4	85	33W1D	5			
51	21W5D	4	86	33W4D	5			
52	22W1D	4	87	33W6D	5			
53	22W3D	4	88	34W2D	5			
54	22W5D	4	89	34W4D	5			

Table 71. OFD : Hansmann

Ft : Paris Unit : Ft (mm) Age (Day) SD (mm)

FT	Age	SD	FT	Age	SD
13	13W0D	2	48	25W3D	4
14	13W3D	2	49	25W5D	4
15	13W6D	2	50	26W1D	4
16	14W2D	2	51	26W3D	4
17	14W5D	3	52	26W6D	4
18	15W1D	3	53	27W1D	4
19	15W4D	3	54	27W4D	4
20	16W0D	4	55	28W0D	4
21	16W2D	4	56	28W3D	4
22	16W4D	4	57	28W6D	4
23	17W0D	4	58	29W2D	4
24	17W2D	4	59	29W5D	4
25	17W4D	4	60	30W1D	4
26	18W0D	4	61	30W5D	4
27	18W2D	4	62	31W1D	4
28	18W4D	4	63	31W4D	4
29	19W0D	4	64	32W0D	4
30	19W2D	4	65	32W3D	4
31	19W4D	4	66	33W0D	5
32	20W0D	4	67	33W3D	5
33	20W2D	4	68	34W0D	5
34	20W4D	4	69	34W4D	5
35	21W0D	4	70	35W1D	5
36	21W2D	4	71	35W5D	5
37	21W4D	4	72	36W2D	5
38	22W0D	4	73	36W6D	5
39	22W2D	4	74	37W3D	5
40	22W4D	4	75	38W0D	6
41	23W0D	4			
42	23W2D	4			
43	23W4D	4			
44	24W0D	4			
45	24W2D	4			
46	24W5D	4			
47	25W0D	4			

Table 72. Ft : Paris

BD : Berkowitz Unit : BD (mm) Age (Day) SD (mm)

BD	Age	SD	BD	Age	SD
13	11W4D	0	47	28W1D	0
14	11W5D	0	48	28W6D	0
15	12W0D	0	49	29W4D	0
16	12W2D	0	50	30W2D	0
17	12W4D	0	51	31W0D	0
18	13W0D	0	52	31W6D	0
19	13W4D	0	53	32W6D	0
20	14W0D	0	54	33W6D	0
21	14W4D	0	55	34W6D	0
22	15W0D	0	56	35W6D	0
23	15W4D	0	57	36W6D	0
24	15W5D	0	58	38W0D	0
25	16W0D	0	59	39W2D	0
26	16W4D	0			
27	17W1D	0			
28	17W5D	0			
29	18W2D	0			
30	18W4D	0			
31	18W6D	0			
32	19W2D	0			
33	19W5D	0			
34	20W2D	0			
35	20W5D	0			
36	21W2D	0			
37	21W5D	0			
38	22W1D	0			
39	22W5D	0			
40	23W1D	0			
41	23W5D	0			
42	24W1D	0			
43	24W5D	0			
44	25W4D	0			
45	26W3D	0			
46	27W2D	0			

Table 73. BD : Berkowitz

BPD : Kurtz Unit : BPD (mm) Age (Day) SD (mm)

BPD	Age	SD	BPD	Age	SD	BPD	Age	SD
21	12W0D	4	55	22W1D	5	89	36W0D	5
22	12W3D	4	56	22W3D	5	90	36W5D	5
23	13W0D	4	57	22W6D	5	91	37W3D	5
24	13W2D	4	58	23W1D	5	92	38W1D	5
25	13W4D	4	59	23W4D	5	93	38W6D	5
26	13W6D	4	60	24W0D	5	94	39W3D	5
27	14W1D	4	61	24W2D	5	95	40W0D	5
28	14W3D	4	62	24W5D	5	96	40W4D	5
29	14W5D	4	63	25W0D	5	97	41W1D	5
30	15W0D	4	64	25W3D	5	98	41W6D	5
31	15W2D	4	65	25W6D	5			
32	15W4D	4	66	26W1D	5			
33	15W6D	4	67	26W4D	5			
34	16W1D	4	68	26W6D	5			
35	16W3D	4	69	27W2D	5			
36	16W5D	4	70	27W5D	5			
37	17W0D	4	71	28W0D	5			
38	17W2D	4	72	28W3D	5			
39	17W4D	4	73	28W5D	5			
40	17W6D	4	74	29W1D	5			
41	18W1D	4	75	29W4D	5			
42	18W3D	4	76	30W0D	5			
43	18W5D	4	77	30W3D	5			
44	19W0D	4	78	30W6D	5			
45	19W2D	4	79	31W2D	5			
46	19W4D	4	80	31W5D	5			
47	19W6D	4	81	32W1D	5			
48	20W1D	4	82	32W5D	5			
49	20W3D	4	83	33W1D	5			
50	20W5D	4	84	33W4D	5			
51	21W0D	4	85	34W0D	5			
52	21W2D	4	86	34W3D	5			
53	21W4D	4	87	34W6D	5			
54	21W6D	4	88	35W3D	5			

Table 74. BPD : Kurtz

AC : Sostoa Unit : AC (mm) Age (Day) SD (mm)
Sostoa : Hospital de la Santa Cruzy San Pablo, serviejo de obst.ygynecol

AC	Age	SD	AC	Age	SD
70	14W0D	22	240	28W4D	22
75	14W3D	22	245	29W1D	22
80	15W0D	22	250	29W4D	22
85	15W2D	22	255	30W0D	22
90	15W4D	22	260	30W4D	22
95	15W5D	22	265	31W0D	22
100	16W1D	22	270	31W3D	22
105	16W4D	22	275	31W6D	22
110	17W0D	22	280	32W5D	22
115	17W4D	22	285	33W2D	22
120	18W0D	22	290	33W5D	22
125	18W3D	22	295	34W1D	22
130	18W6D	22	300	34W4D	22
135	19W3D	22	305	35W0D	22
140	19W6D	22	310	35W3D	22
145	20W1D	22	315	35W6D	22
150	20W3D	22	320	36W4D	22
155	20W5D	22	325	37W2D	22
160	21W0D	22	330	38W0D	22
165	21W3D	22	335	38W5D	22
170	21W6D	22	340	39W3D	22
175	22W3D	22	344	40W0D	22
180	22W6D	22			
185	23W2D	22			
190	23W6D	22			
195	24W2D	22			
200	24W5D	22			
205	25W2D	22			
210	25W5D	22			
215	26W2D	22			
220	26W5D	22			
225	27W1D	22			
230	27W5D	22			
235	28W1D	22			

Table 75. AC : Sostoa

BPD : Sostoa Unit : BPD (mm) Age (Day) SD (mm)
Sostoa : Hospital de la Santa Cruzy San Pablo, serviejo de obst.ygynecol

BPD	Age	SD	BPD	Age	SD
24	14W0D	4	58	24W5D	5
25	14W2D	4	59	25W1D	5
26	14W4D	4	60	25W3D	5
27	14W6D	4	61	25W5D	5
28	15W1D	4	62	26W0D	5
29	15W3D	4	63	26W3D	5
30	15W5D	4	64	26W5D	5
31	16W0D	4	65	27W0D	5
32	16W2D	4	66	27W2D	5
33	16W4D	4	67	27W5D	5
34	17W0D	4	68	28W0D	5
35	17W2D	4	69	28W2D	5
36	17W4D	4	70	28W4D	5
37	17W6D	4	71	29W0D	5
38	18W1D	4	72	29W3D	5
39	18W3D	4	73	29W6D	5
40	18W5D	4	74	30W2D	5
41	19W0D	4	75	30W5D	5
42	19W2D	4	76	31W1D	5
43	19W4D	4	77	31W4D	5
44	20W0D	5	78	32W0D	5
45	20W3D	5	79	32W3D	5
46	21W0D	5	80	32W6D	5
47	21W2D	5	81	33W2D	5
48	21W4D	5	82	33W5D	5
49	21W6D	5	83	34W1D	5
50	22W1D	5	84	34W4D	5
51	22W4D	5	85	35W0D	5
52	22W6D	5	86	36W0D	5
53	23W1D	5	87	37W0D	5
54	23W3D	5	88	38W0D	5
55	23W6D	5	89	39W0D	5
56	24W1D	5	90	40W0D	5
57	24W3D	5			

Table 76. BPD : Sostoa

FL : Sostoa Unit : FL (mm) Age (Day) SD (mm)
Sostoa : Hospital de la Santa Cruzy San Pablo, serviejo de obst.ygynecol

FL	Age	SD	FL	Age	SD
10	14W0D	4	44	26W4D	4
11	14W2D	4	45	27W0D	5
12	14W5D	4	46	27W3D	5
13	15W0D	4	47	28W0D	5
14	15W3D	4	48	28W3D	5
15	15W6D	4	49	29W0D	5
16	16W1D	4	50	29W3D	5
17	16W4D	4	51	30W0D	5
18	16W6D	4	52	30W3D	5
19	17W2D	4	53	31W0D	5
20	17W5D	4	54	31W3D	5
21	18W0D	4	55	32W0D	5
22	18W3D	4	56	32W3D	5
23	18W5D	4	57	33W0D	5
24	19W1D	4	58	33W3D	5
25	19W4D	4	59	34W0D	5
26	19W6D	4	60	34W3D	5
27	20W2D	4	61	35W0D	5
28	20W4D	4	62	35W3D	5
29	21W0D	4	63	36W0D	5
30	21W3D	4	64	36W3D	5
31	21W5D	4	65	37W0D	5
32	22W1D	4	66	37W4D	5
33	22W3D	4	67	38W1D	5
34	22W6D	4	68	38W5D	5
35	23W2D	4	69	39W2D	5
36	23W4D	4	70	40W0D	5
37	24W0D	4			
38	24W2D	4			
39	24W5D	4			
40	25W1D	4			
41	25W3D	4			
42	25W6D	4			
43	26W1D	4			

Table 77. FL : Sostoa

HC : Sostoa Unit : HC (mm) Age (Day) SD (mm)

HC	Age	SD	HC	Age	SD
93	14W0D	15	260	27W6D	22
95	14W1D	15	265	28W2D	22
100	14W6D	17	270	28W5D	22
105	15W1D	18	275	29W1D	22
110	15W4D	19	280	29W4D	22
115	15W6D	19	285	30W0D	22
120	16W1D	20	290	30W5D	22
125	16W4D	21	295	31W2D	22
130	16W6D	21	300	32W0D	22
135	17W2D	22	305	32W4D	22
140	17W5D	22	310	33W2D	22
145	18W1D	22	315	34W2D	22
150	18W4D	22	320	35W2D	22
155	19W0D	22	325	36W2D	22
160	19W3D	22	330	37W2D	22
165	19W6D	22	335	38W2D	22
170	20W2D	22	340	39W2D	22
175	20W5D	22	343	40W0D	22
180	21W1D	22			
185	21W4D	22			
190	22W0D	22			
195	22W3D	22			
200	22W6D	22			
205	23W2D	22			
210	23W4D	22			
215	24W0D	22			
220	24W3D	22			
225	24W6D	22			
230	25W2D	22			
235	25W5D	22			
240	26W1D	22			
245	26W4D	22			
250	27W0D	22			
255	27W3D	22			

Table 78. HC : Sostoa

OFD : Sostoa Unit : OFD (mm) Age (Day) SD (mm)

OFD	Age	SD	OFD	Age	SD	OFD	Age	SD
28	14W0D	0	62	22W4D	0	96	32W0D	0
29	14W1D	0	63	22W6D	0	97	32W2D	0
30	14W3D	0	64	23W1D	0	98	32W5D	0
31	14W5D	0	65	23W2D	0	99	33W1D	0
32	15W0D	0	66	23W4D	0	100	33W4D	0
33	15W1D	0	67	23W6D	0	101	34W0D	0
34	15W3D	0	68	24W1D	0	102	34W5D	0
35	15W5D	0	69	24W2D	0	103	35W3D	0
36	16W0D	0	70	24W4D	0	104	36W1D	0
37	16W2D	0	71	24W6D	0	105	37W0D	0
38	16W3D	0	72	25W1D	0	106	37W5D	0
39	16W5D	0	73	25W3D	0	107	38W3D	0
40	17W0D	0	74	25W4D	0	108	39W1D	0
41	17W2D	0	75	25W6D	0	109	40W0D	0
42	17W3D	0	76	26W1D	0			
43	17W5D	0	77	26W3D	0			
44	18W0D	0	78	26W4D	0			
45	18W2D	0	79	26W6D	0			
46	18W4D	0	80	27W1D	0			
47	18W5D	0	81	27W3D	0			
48	19W0D	0	82	27W5D	0			
49	19W2D	0	83	27W6D	0			
50	19W4D	0	84	28W1D	0			
51	19W5D	0	85	28W3D	0			
52	20W0D	0	86	28W5D	0			
53	20W2D	0	87	28W6D	0			
54	20W4D	0	88	29W1D	0			
55	20W6D	0	89	29W3D	0			
56	21W0D	0	90	29W5D	0			
57	21W2D	0	91	30W0D	0			
58	21W4D	0	92	30W2D	0			
59	21W6D	0	93	30W5D	0			
60	22W0D	0	94	31W1D	0			
61	22W2D	0	95	31W4D	0			

Table 79. OFD : Sostoa

BD : Sostoa Unit : BD (mm) Age (Day) SD (mm)
Sostoa : Hospital de la Santa Cruzy San Pablo, serviejo de obst.ygynecol

BD	Age	SD	BD	Age	SD
23	17W0D	0	57	37W0D	0
24	17W3D	0	58	38W0D	0
25	18W0D	0	59	39W0D	0
26	18W2D	0	60	40W0D	0
27	18W4D	0			
28	19W0D	0			
29	19W3D	0			
30	20W0D	0			
31	20W3D	0			
32	21W0D	0			
33	21W3D	0			
34	22W0D	0			
35	22W3D	0			
36	23W0D	0			
37	23W3D	0			
38	24W0D	0			
39	25W0D	0			
40	26W0D	0			
41	26W3D	0			
42	27W0D	0			
43	27W3D	0			
44	28W0D	0			
45	28W3D	0			
46	29W0D	0			
47	29W3D	0			
48	30W0D	0			
49	30W3D	0			
50	31W0D	0			
51	32W0D	0			
52	33W0D	0			
53	34W0D	0			
54	35W0D	0			
55	36W0D	0			
56	36W3D	0			

Table 80. BD : Sostoa

CRL : Nelson Unit : CRL (mm) Age (Day) SD (mm)

CRL	Age	SD	CRL	Age	SD	CRL	Age	SD
3	7W4D	4	37	10W3D	6	71	13W2D	7
4	7W4D	4	38	10W3D	6	72	13W3D	7
5	7W5D	4	39	10W4D	6	73	13W4D	7
6	7W5D	4	40	10W5D	6			
7	7W6D	4	41	10W5D	6			
8	7W6D	4	42	10W6D	6			
9	8W0D	4	43	10W6D	6			
10	8W1D	4	44	11W0D	6			
11	8W1D	4	45	11W1D	7			
12	8W2D	4	46	11W1D	7			
13	8W2D	4	47	11W2D	7			
14	8W3D	4	48	11W2D	7			
15	8W4D	4	49	11W3D	7			
16	8W4D	4	50	11W4D	7			
17	8W5D	5	51	11W4D	7			
18	8W5D	5	52	11W5D	7			
19	8W6D	5	53	11W5D	7			
20	9W0D	5	54	11W6D	7			
21	9W0D	5	55	12W0D	7			
22	9W1D	5	56	12W0D	7			
23	9W1D	5	57	12W1D	7			
24	9W2D	5	58	12W1D	7			
25	9W3D	5	59	12W2D	7			
26	9W3D	5	60	12W3D	7			
27	9W4D	5	61	12W3D	7			
28	9W4D	5	62	12W4D	7			
29	9W5D	5	63	12W4D	7			
30	9W6D	5	64	12W5D	7			
31	9W6D	6	65	12W6D	7			
32	10W0D	6	66	12W6D	7			
33	10W0D	6	67	13W0D	7			
34	10W1D	6	68	13W0D	7			
35	10W2D	6	69	13W1D	7			
36	10W2D	6	70	13W2D	7			

Table 81. CRL : Nelson

AC : Jeanty Unit : AC (mm) Age (Day) SD (mm)
Jeanty : Radiology 143 : 513, 1982

AC	Age	SD	AC	Age	SD
50	11W2D	22	220	27W3D	22
55	11W5D	22	225	28W0D	22
60	12W1D	22	230	28W3D	22
65	12W5D	22	235	29W0D	22
70	13W1D	22	240	29W3D	22
75	13W4D	22	245	30W0D	22
80	14W1D	22	250	30W4D	22
85	14W4D	22	255	31W1D	22
90	15W0D	22	260	31W5D	22
95	15W4D	22	265	32W2D	22
100	16W0D	22	270	32W6D	22
105	16W3D	22	275	33W3D	22
110	17W0D	22	280	34W1D	22
115	17W3D	22	285	34W6D	22
120	17W6D	22	290	35W4D	22
125	18W3D	22	295	36W2D	22
130	18W6D	22	300	37W0D	22
135	19W2D	22	305	37W6D	22
140	19W6D	22	310	38W6D	22
145	20W2D	22	315	39W6D	22
150	20W6D	22			
155	21W2D	22			
160	21W5D	22			
165	22W2D	22			
170	22W5D	22			
175	23W1D	22			
180	23W5D	22			
185	24W1D	22			
190	24W4D	22			
195	25W1D	22			
200	25W4D	22			
205	26W0D	22			
210	26W4D	22			
215	27W0D	22			

Table 82. AC : Jeanty

BPD : Jeanty Unit : BPD (mm) Age (Day) SD (mm)
Jeanty : Radiology 143 : 513, 1982

BPD	Age	SD	BPD	Age	SD	BPD	Age	SD
10	9W1D	3	43	18W1D	3	76	29W3D	5
11	9W2D	3	44	18W3D	3	77	29W6D	5
12	9W4D	3	45	18W5D	3	78	30W2D	5
13	9W6D	3	46	19W0D	3	79	30W5D	5
14	10W1D	3	47	19W2D	3	80	31W1D	5
15	10W3D	3	48	19W4D	3	81	31W4D	5
16	10W5D	3	49	19W6D	4	82	32W0D	5
17	11W0D	3	50	20W1D	4	83	32W3D	5
18	11W2D	3	51	20W3D	4	84	32W6D	5
19	11W4D	3	52	20W6D	4	85	33W3D	5
20	11W6D	3	53	21W1D	4	86	33W6D	5
21	12W1D	3	54	21W4D	4	87	34W2D	5
22	12W3D	3	55	21W6D	4	88	34W6D	5
23	12W5D	3	56	22W1D	4	89	35W2D	5
24	12W6D	3	57	22W4D	4	90	35W6D	5
25	13W1D	3	58	22W6D	4	91	36W2D	5
26	13W3D	3	59	23W2D	4	92	36W5D	5
27	13W5D	3	60	23W4D	4	93	37W2D	5
28	14W0D	3	61	23W6D	4	94	37W5D	5
29	14W2D	3	62	24W2D	4	95	38W2D	5
30	14W4D	3	63	24W4D	4			
31	14W6D	3	64	25W0D	4			
32	15W1D	3	65	25W2D	4			
33	15W3D	3	66	25W4D	4			
34	15W5D	3	67	26W0D	4			
35	16W0D	3	68	26W2D	4			
36	16W2D	3	69	26W5D	5			
37	16W3D	3	70	27W0D	5			
38	16W5D	3	71	27W3D	5			
39	17W0D	3	72	27W6D	5			
40	17W2D	3	73	28W2D	5			
41	17W4D	3	74	28W5D	5			
42	17W6D	3	75	29W1D	5			

Table 83. BPD : Jeanty

CRL : Jeanty Unit : CRL (mm) Age (Day) SD (mm)
Jeanty : Radiology 143 : 513, 1982

CRL	Age	SD	CRL	Age	SD
5	6W2D	4	38	10W5D	7
6	6W3D	4	39	10W6D	7
7	6W4D	4	40	10W6D	7
8	6W6D	4	41	10W6D	7
9	7W1D	4	42	11W0D	7
10	7W2D	4	43	11W0D	7
11	7W3D	4	44	11W1D	7
12	7W4D	4	45	11W2D	7
13	7W5D	4	46	11W2D	7
14	7W6D	4	47	11W3D	7
15	8W0D	5	48	11W4D	7
16	8W1D	5	49	11W4D	7
17	8W2D	5	50	11W5D	7
18	8W3D	5	51	11W6D	7
19	8W4D	5	52	11W6D	7
20	8W5D	5	53	12W0D	7
21	8W6D	6	54	12W1D	7
22	9W0D	6			
23	9W1D	6			
24	9W2D	6			
25	9W3D	6			
26	9W4D	7			
27	9W4D	7			
28	9W4D	7			
29	9W5D	7			
30	9W6D	7			
31	10W0D	7			
32	10W0D	7			
33	10W1D	7			
34	10W2D	7			
35	10W3D	7			
36	10W3D	7			
37	10W4D	7			

Table 84. CRL : Jeanty

FL : Jeanty Unit : FL (mm) Age (Day) SD (mm)
Jeanty : Radiology 143 : 513, 1982

FL	Age	SD	FL	Age	SD	FL	Age	SD
10	12W4D	4	43	24W2D	5	76	38W0D	5
11	12W6D	4	44	24W5D	5	77	38W4D	5
12	13W1D	4	45	25W1D	5	78	39W1D	5
13	13W4D	4	46	25W3D	5	79	39W4D	5
14	13W6D	4	47	25W6D	5	80	40W0D	5
15	14W2D	4	48	26W2D	5			
16	14W4D	4	49	26W4D	5			
17	14W6D	4	50	27W0D	5			
18	15W2D	4	51	27W3D	5			
19	15W4D	4	52	27W5D	5			
20	16W0D	4	53	28W1D	5			
21	16W2D	4	54	28W4D	5			
22	16W4D	4	55	29W0D	5			
23	17W0D	4	56	29W3D	5			
24	17W2D	4	57	29W6D	5			
25	17W5D	4	58	30W2D	5			
26	18W0D	4	59	30W5D	5			
27	18W2D	4	60	31W1D	5			
28	18W5D	4	61	31W4D	5			
29	19W0D	4	62	32W0D	5			
30	19W3D	5	63	32W3D	5			
31	19W5D	5	64	32W6D	5			
32	20W1D	5	65	33W2D	5			
33	20W4D	5	66	33W5D	5			
34	20W6D	5	67	34W1D	5			
35	21W2D	5	68	34W4D	5			
36	21W5D	5	69	35W0D	5			
37	22W0D	5	70	35W3D	5			
38	22W3D	5	71	35W6D	5			
39	22W6D	5	72	36W2D	5			
40	23W1D	5	73	36W5D	5			
41	23W4D	5	74	37W1D	5			
42	24W0D	5	75	37W4D	5			

Table 85. FL : Jeanty

BD : Jeanty Unit : BD (mm) Age (Day) SD (mm)
Jeanty : Radiology 143 : 513, 1982

BD	Age	SD	BD	Age	SD
15	10W3D	0	48	30W0D	0
16	11W0D	0	49	30W4D	0
17	11W4D	0	50	31W1D	0
18	12W1D	0	51	31W5D	0
19	12W5D	0	52	32W2D	0
20	13W2D	0	53	33W0D	0
21	13W6D	0	54	33W4D	0
22	14W4D	0	55	34W1D	0
23	15W1D	0	56	34W5D	0
24	15W5D	0	57	35W2D	0
25	16W2D	0	58	35W6D	0
26	16W6D	0	59	36W4D	0
27	17W3D	0	60	37W1D	0
28	18W1D	0	61	37W5D	0
29	18W5D	0	62	38W2D	0
30	19W2D	0	63	38W6D	0
31	19W6D	0	64	39W3D	0
32	20W3D	0	65	40W1D	0
33	21W0D	0			
34	21W5D	0			
35	22W2D	0			
36	22W6D	0			
37	23W3D	0			
38	24W0D	0			
39	24W4D	0			
40	25W2D	0			
41	25W6D	0			
42	26W3D	0			
43	27W0D	0			
44	27W4D	0			
45	28W1D	0			
46	28W5D	0			
47	29W3D	0			

Table 86. BD : Jeanty

BPD : Campbell Unit : BPD (mm) Age (Day) SD (mm)
King's College Hospital London (Am.J.obst.gynecol) Oct 1, 1982

BPD	Age	SD	BPD	Age	SD	BPD	Age	SD
20	11W3D	3	53	22W2D	4	86	35W1D	5
21	11W5D	3	54	22W5D	4	87	35W4D	5
22	12W0D	3	55	23W0D	4	88	36W0D	5
23	12W2D	3	56	23W2D	4	89	36W3D	5
24	12W5D	3	57	23W5D	4	90	36W6D	5
25	13W0D	3	58	24W0D	4	91	37W2D	5
26	13W2D	3	59	24W2D	4	92	37W5D	5
27	13W5D	3	60	24W5D	4	93	38W1D	5
28	14W0D	3	61	25W0D	4	94	38W4D	5
29	14W2D	3	62	25W2D	4	95	39W0D	5
30	14W5D	3	63	25W5D	4	96	39W3D	5
31	15W0D	3	64	26W0D	4	97	39W6D	5
32	15W2D	3	65	26W2D	4			
33	15W5D	3	66	26W5D	5			
34	16W0D	3	67	27W0D	5			
35	16W2D	3	68	27W3D	5			
36	16W5D	3	69	27W6D	5			
37	17W0D	3	70	28W2D	5			
38	17W2D	3	71	28W5D	5			
39	17W5D	3	72	29W1D	5			
40	18W0D	3	73	29W4D	5			
41	18W2D	3	74	30W0D	5			
42	18W5D	3	75	30W3D	5			
43	19W0D	4	76	30W6D	5			
44	19W2D	4	77	31W2D	5			
45	19W5D	4	78	31W5D	5			
46	20W0D	4	79	32W1D	5			
47	20W2D	4	80	32W4D	5			
48	20W5D	4	81	33W0D	5			
49	21W0D	4	82	33W3D	5			
50	21W2D	4	83	33W6D	5			
51	21W5D	4	84	34W2D	5			
52	22W0D	4	85	34W5D	5			

Table 87. BPD : Campbell

CRL : Campbell Unit : CRL (mm) Age (Day) SD (mm)
King's College Hospital London (Am.J.obst.gynecol) Oct 1, 1982

CRL	Age	SD	CRL	Age	SD	CRL	Age	SD
10	7W0D	5	43	10W5D	7	76	13W4D	7
11	7W0D	5	44	10W6D	7	77	13W4D	7
12	7W1D	5	45	10W6D	7	78	13W4D	7
13	7W2D	5	46	11W0D	7	79	13W5D	7
14	7W3D	5	47	11W1D	7	80	13W5D	7
15	7W4D	5	48	11W1D	7	81	13W5D	7
16	7W5D	5	49	11W2D	7	82	13W6D	7
17	7W6D	5	50	11W2D	7	83	13W6D	7
18	8W0D	5	51	11W3D	7	84	13W6D	7
19	8W1D	5	52	11W4D	7	85	14W0D	7
20	8W2D	5	53	11W4D	7			
21	8W3D	5	54	11W5D	7			
22	8W3D	6	55	11W5D	7			
23	8W4D	6	56	11W6D	7			
24	8W5D	6	57	11W6D	7			
25	8W6D	6	58	12W0D	7			
26	9W0D	6	59	12W1D	7			
27	9W1D	6	60	12W1D	7			
28	9W2D	6	61	12W2D	7			
29	9W3D	6	62	12W2D	7			
30	9W4D	6	63	12W3D	7			
31	9W5D	6	64	12W4D	7			
32	9W6D	6	65	12W4D	7			
33	10W0D	7	66	12W5D	7			
34	10W0D	7	67	12W5D	7			
35	10W1D	7	68	12W6D	7			
36	10W1D	7	69	12W6D	7			
37	10W2D	7	70	13W0D	7			
38	10W2D	7	71	13W1D	7			
39	10W3D	7	72	13W1D	7			
40	10W4D	7	73	13W2D	7			
41	10W4D	7	74	13W2D	7			
42	10W5D	7	75	13W3D	7			

Table 88. CRL : Campbell

FL : Campbell Unit : FL (mm) Age (Day) SD (mm)
King's College Hospital London (Am.J.obst.gynecol) Oct 1, 1982

FL	Age	SD	FL	Age	SD
16	14W2D	4	49	26W2D	5
17	14W4D	4	50	26W4D	5
18	14W6D	4	51	27W0D	5
19	15W1D	4	52	27W3D	5
20	15W4D	4	53	27W5D	5
21	15W6D	4	54	28W1D	5
22	16W1D	4	55	28W4D	5
23	16W4D	4	56	29W0D	5
24	16W6D	4	57	29W2D	5
25	17W1D	4	58	29W5D	5
26	17W4D	4	59	30W1D	5
27	17W6D	4	60	30W4D	5
28	18W1D	4	61	31W1D	5
29	18W4D	4	62	31W5D	5
30	18W6D	4	63	32W2D	5
31	19W1D	4	64	32W6D	5
32	19W4D	4	65	33W3D	5
33	19W6D	4	66	34W0D	5
34	20W1D	4	67	34W4D	5
35	20W4D	4	68	35W1D	5
36	20W6D	4	69	35W5D	5
37	21W1D	4	70	36W3D	5
38	21W4D	5	71	37W1D	5
39	22W0D	5	72	37W6D	5
40	22W3D	5	73	38W4D	5
41	22W6D	5	74	39W2D	5
42	23W2D	5	75	40W0D	5
43	23W5D	5	76	40W5D	5
44	24W1D	5			
45	24W4D	5			
46	25W0D	5			
47	25W3D	5			
48	25W6D	5			

Table 89. FL : Campbell

BD : Campbell Unit : BD (mm) Age (Day) SD (mm)
King's College Hospital London (Am.J.obst.gynecol) Oct 1, 1982

BD	Age	SD	BD	Age	SD
14	11W4D	0	47	27W3D	0
15	12W0D	0	48	28W2D	0
16	12W3D	0	49	29W0D	0
17	12W6D	0	50	29W6D	0
18	13W2D	0	51	30W5D	0
19	13W5D	0	52	31W5D	0
20	14W1D	0	53	32W6D	0
21	14W4D	0	54	33W6D	0
22	15W0D	0	55	35W0D	0
23	15W3D	0	56	36W0D	0
24	15W6D	0	57	37W1D	0
25	16W2D	0	58	38W1D	0
26	16W5D	0	59	39W2D	0
27	17W1D	0			
28	17W4D	0			
29	18W0D	0			
30	18W3D	0			
31	18W6D	0			
32	19W2D	0			
33	19W5D	0			
34	20W1D	0			
35	20W5D	0			
36	21W1D	0			
37	21W4D	0			
38	22W0D	0			
39	22W3D	0			
40	22W6D	0			
41	23W2D	0			
42	23W5D	0			
43	24W2D	0			
44	25W0D	0			
45	25W6D	0			
46	26W4D	0			

Table 90. BD : Campbell

AC : Asum Unit : AC (mm) Age (week and days) Range (days)

AC	Age	AC	Age
35	10W0D ± 8	217	26W0D ± 12
46	11W0D ± 8	228	27W0D ± 14
57	12W0D ± 8	240	28W0D ± 14
69	13W0D ± 8	251	29W0D ± 14
80	14W0D ± 9	263	30W0D ± 14
92	15W0D ± 9	274	31W0D ± 14
103	16W0D ± 9	285	32W0D ± 16
114	17W0D ± 9	297	33W0D ± 16
126	18W0D ± 10	308	34W0D ± 18
137	19W0D ± 10	320	35W0D ± 18
149	20W0D ± 10	331	36W0D ± 18
160	21W0D ± 10	342	37W0D ± 18
171	22W0D ± 10	354	38W0D ± 20
183	23W0D ± 10	365	39W0D ± 20
194	24W0D ± 12	377	40W0D ± 20
206	25W0D ± 12		

Table 91. AC : ASUM

CRL: Asum Unit : CRL (mm) Age (week and days) Range (days)

CRL	Age	CRL	Age
2	6W0D ± 0	34	10W1D ± 0
3	6W1D ± 0	36	10W2D ± 0
4	6W2D ± 0	37	10W3D ± 0
5	6W3D ± 0	38	10W4D ± 0
6	6W4D ± 0	40	10W5D ± 0
7	6W5D ± 0	41	10W6D ± 0
8	6W6D ± 0	43	11W0D ± 0
9	7W0D ± 0	45	11W1D ± 0
10	7W1D ± 0	46	11W2D ± 0
11	7W2D ± 0	48	11W3D ± 0
12	7W3D ± 0	50	11W4D ± 0
13	7W4D ± 0	51	11W5D ± 0
14	7W5D ± 0	53	11W6D ± 0
15	7W6D ± 0	55	12W0D ± 0
16	8W0D ± 0	57	12W1D ± 0
17	8W1D ± 0	58	12W2D ± 0
18	8W2D ± 0	60	12W3D ± 0
19	8W3D ± 0	62	12W4D ± 0
20	8W4D ± 0	64	12W5D ± 0
22	8W5D ± 0	66	12W6D ± 0
23	8W6D ± 0	68	13W0D ± 0
24	9W0D ± 0	70	13W1D ± 0
25	9W1D ± 0	72	13W2D ± 0
26	9W2D ± 0	74	13W3D ± 0
27	9W3D ± 0	76	13W4D ± 0
29	9W4D ± 0	78	13W5D ± 0
30	9W5D ± 0	80	13W6D ± 0
31	9W6D ± 0	82	14W0D ± 0
33	10W0D ± 0		

Table 92. CRL : ASUM

BPD: Asum Unit : BPD (mm) Age (week and days) Range (days)

BPD	Age	BPD	Age	BPD	Age
20	12W0D ± 4	51	21W0D ± 11	82	32W1D ± 18
21	12W2D ± 4	52	21W2D ± 11	83	32W4D ± 18
22	12W4D ± 4	53	21W5D ± 11	84	33W0D ± 19
23	12W6D ± 4	54	22W0D ± 12	85	33W3D ± 0
24	13W1D ± 5	55	22W3D ± 12	86	33W6D ± 0
25	13W3D ± 5	56	22W5D ± 12	87	34W2D ± 0
26	13W4D ± 5	57	22W0D ± 12	88	34W6D ± 0
27	13W6D ± 5	58	23W3D ± 13	89	35W2D ± 0
28	14W1D ± 5	59	23W5D ± 13	90	35W6D ± 0
29	14W3D ± 6	60	24W1D13	91	36W3D ± 0
30	14W5D ± 6	61	24W3D13	92	37W0D ± 0
31	15W0D ± 6	62	24W5D ± 13	93	37W5D ± 0
32	15W2D ± 6	63	25W1D ± 14	94	38W4D ± 0
33	15W4D ± 7	64	25W3D ± 14	95	39W3D ± 0
34	15W6D ± 7	65	25W6D ± 14	96	40W4D ± 0
35	16W1D ± 7	66	26W1D ± 14	97	41W5D ± 0
36	16W3D ± 7	67	26W4D ± 15	98	43W0D ± 0
37	16W5D ± 8	68	26W6D ± 15		
38	17W0D ± 8	69	27W2D ± 15		
39	17W2D ± 8	70	27W4D ± 15		
40	17W4D ± 8	71	28W0D ± 16		
41	18W0D ± 9	72	28W3D ± 16		
42	18W2D ± 9	73	28W5D ± 16		
43	18W4D ± 9	74	29W1D ± 16		
44	18W6D ± 9	75	29W3D ± 17		
45	19W1D ± 9	76	29W6D ± 17		
46	19W3D ± 10	77	30W2D ± 17		
47	19W6D ± 10	78	30W4D ± 17		
48	20W1D ± 10	79	31W0D ± 17		
49	20W3D ± 10	80	31W3D ± 18		
50	20W5D ± 11	81	31W5D ± 18		

Table 93. BPD : ASUM

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